

## SUPPLEMENT.

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

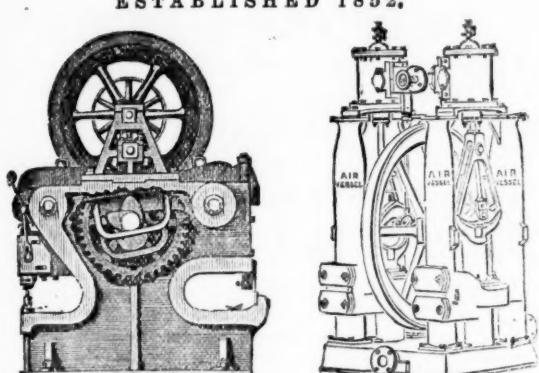
*[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]*

No. 2245.—VOL. XLVIII.

LONDON, SATURDAY, AUGUST 31, 1878.

PRICE (WITH THE JOURNAL) SIXPENCE.  
PER ANNUM, BY POST, £1 4s.

**JOHN CAMERON'S**  
SPECIALITIES ARE ALL SIZES OF  
**Steam Pumps, Shipbuilders' Tools,**  
**BAR SHEARS.**  
ESTABLISHED 1852.



**OLDFIELD ROAD IRON WORKS,**  
SALFORD, MANCHESTER.

For Excellence  
and Practical Success  
of Engines



Represented by  
Model exhibited by  
this Firm.

**HARVEY AND CO.**  
ENGINEERS AND GENERAL MERCHANTS,  
HAYLE, CORNWALL,  
LONDON OFFICE,—186, GRESHAM HOUSE, E.C.

MANUFACTURERS OF  
PUMPING and other LAND ENGINES and MARINE STEAM ENGINES  
of the largest and most approved kinds in use. SUGAR MACHINERY,  
MILLWORK, MINING MACHINERY, AND MACHINERY IN GENERAL.  
SHIPBUILDERS IN WOOD AND IRON.

MANUFACTURERS OF  
HUSBAND'S PATENT PNEUMATIC STAMPS.

SECONDHAND MINING MACHINERY FOR SALE.  
In GOOD CONDITION, AT MODERATE PRICES—viz.,

PUMPING ENGINES; WINDING ENGINES; STAMPING ENGINES;  
STEAM CAPSTANS; ORE CRUSHERS; BOILERS and PITWORK of  
various sizes and descriptions; and all kinds of MATERIALS required for  
MINING PURPOSES.

**THE PHOSPHOR BRONZE**  
COMPANY (LIMITED).

139, CANNON STREET, E.C.  
LONDON.

Alloy, No. II., for pinions, ornamental castings, steam  
fittings, &c. .... 110s. per cwt.  
" No. IV., for pinions, pumps, valves, linings,  
cylinder, &c. .... 110s. ....  
" N. VI. (must be cast in chill) for bolts, &c.  
This alloy has very great tensile strength ... 125s. ....  
" No. VII., for hydraulic pumps, valves, and  
plungers, piston rings, bushes and bearings.  
for steel shafts ..... 120s. ....  
" No. XI., special phosphor-bronze bearing metal,  
wearing five times as long as gun metal ..... 105s. ....  
The prices of castings vary according to the pattern, the quantity required, and  
the alloy used.

WIRE ROPES, TUBES OF ALL DESCRIPTIONS, &c.

**STANDARD LUBRICATING OILS**  
COMPANY, LIMITED.

DARK and PALE OILS for MACHINERY, RAILWAY, and MINING  
PURPOSES, from TWO SHILLINGS per gallon, and upwards.

AGENTS WANTED.  
1, DRAPERS' GARDENS, THROGMORTON AVENUE,  
LONDON, E.C.

**ALEX. CHAPLIN AND CO.,**  
CRANSTON HILL ENGINE WORKS, GLASGOW.

PATENTEE AND SOLE MANUFACTURERS OF  
CHAPLINS' PATENT STEAM CRANES, HOISTS,  
LOCOMOTIVES, AND OTHER ENGINES AND BOILERS.

LONDON HOUSE:—  
MCKENDRICK, BALL, AND CO.,  
15, QUEEN VICTORIA STREET, LONDON, E.C.



PARIS, ORDER OF THE CROWN OF PRUSSIA. FALMOUTH,  
BRONZE MEDAL, 1867. SILVER MEDAL, 1867

A DIPLOMA—HIGHEST OF ALL AWARDS—given by the  
Geographical Congress, Paris, 1875—M. Favre, Contractor, having  
exhibited the McLean Drill alone as the MODEL BORING MACHINE  
for the ST. GOTTHARD TUNNEL.

SILVER MEDAL of the Highland and West of Scotland  
Agricultural Society, 1875—HIGHEST AWARD.

At the south end of the St. Gotthard Tunnel, where

### THE MCKEAN ROCK DRILLS

Are exclusively used, the advance made during eight consecutive weeks, ending February 7, was 24·90, 27·60, 24·80, 26·10, 28·30, 27·10, 28·40, 28·70 metres. Total advance of south heading during January was 121·30 metres, or 133 yards.

In a series of comparative trials made at the St. Gotthard Tunnel, the McLean Rock Drill continued to work until the pressure was reduced to one-half atmosphere ( $7\frac{1}{2}$  lbs.), showing almost the entire motive force to be available for the blow against the rock—a result of itself indicating many advantages.

The GREAT WESTERN RAILWAY has adopted these Machines for the SEVERN TUNNEL; the LONDON AND NORTH-WESTERN RAILWAY for the FESTINIOG TUNNEL; and the BRITISH GOVERNMENT for several Public Works. A considerable number of Mining Companies are now using them. Shafts and Galleries are driven at from three to six times the speed of hand labour, according to the size and number of machines employed, and with important saving in cost. The ratio of advantage over hand labour is greatest where the rock is hardest.

These Machines possess many advantages, which give them a value unapproached by any other system of Boring Machine.

THE MCKEAN ROCK DRILL IS ATTAINING GENERAL USE THROUGHOUT THE WORLD FOR MINING, TUNNELLING, QUARRYING, AND SUB-MARINE BORING.

The MCKEAN ROCK DRILLS are the most powerful—the most portable—the most durable—the most compact—of the best mechanical device. They contain the fewest parts—have no weak parts—act without SHOCK upon any of the operating parts—work with a lower pressure than any other Rock Drill—may be worked at a higher pressure than any other—may be run with safety to FIFTEEN HUNDRED STROKES PER MINUTE—do not require a mechanic to work them—are the smallest, shortest, and lightest of all machines—will give the longest feed without change of tool—work with long or short stroke at pleasure of operator.

The SAME Machine may be used for sinking, drifting, or open work. Their working parts are best protected against grit and accidents. The various methods of mounting them are the most efficient.

N.B.—Correspondents should state particulars as to character of work in hand in writing us for information, on receipt of which a special definite answer, with reference to our full illustrated catalogue, will be sent.

PORTABLE BOILERS, AIR COMPRESSORS, BORING STEEL,  
IRON, AND FLEXIBLE TUBING.

The McLean Drill may be seen in operation daily in London.

**McKEAN AND CO.**  
ENGINEERS.  
OFFICES,  
5, RUE SCRIBE, PARIS

MANUFACTURED FOR MCKEAN AND CO. BY  
MESSRS. P. AND W. MACLELLAN, "CLUTHA IRONWORKS,"  
GLASGOW.

**SMITH & FORREST,**  
**OIL REFINERS,**  
**ROSIN OIL DISTILLERS,**  
**GREASE AND VARNISH MANUFACTURERS,**  
HOLT TOWN,  
**MANCHESTER.**  
Price List on application.  
ESTABLISHED TEN YEARS.]

THE  
**DARLINGTON WAGON COMPANY,**  
MANUFACTURERS OF  
**RAILWAY WAGONS**  
OF EVERY DESCRIPTION,

For Cash, or on Deferred Payments, or Hire.  
REPAIRS EXECUTED WITH DESPATCH, ON REASONABLE TERMS.  
OFFICES AND WORKS.

ALBERT HILL, DARLINGTON.

**DUNN'S ROCK DRILL.**  
AND  
**AIR COMPRESSORS,**

FOR DRIVING BED ROCK  
TUNNELS, SINKING  
SHAFTS, AND PERFORMING  
OPEN FIELD OPERATIONS,  
IN THE  
CHEAPEST, SIMPLEST,  
STRONGEST, & MOST EFFECTIVE  
DRILL IN THE WORLD.

Dunn's Patent Rock Drill Company

(LIMITED).  
OFFICE,—193, GOSWELL ROAD  
LONDON, E.C.

PATENT  
**"INGERSOLL ROCK DRILL,"**  
LE GROS, MAYNE, LEAVER, & CO..

60, Queen Victoria Street, London, E.C.  
5, PARK PLACE, NEW YORK, U.S.A.

We claim 40 per cent. greater effective drilling power, and offer to compete with any machine of its class.

The following extracts from the reports of Judges in awarding Medals:—

"2. Its simple construction ensures durability, &c."

"4.—The steam or air cushions at each end of cylinder effectually protect from injury."

"5. Its having an automatic feed, giving it a steady motion, &c."

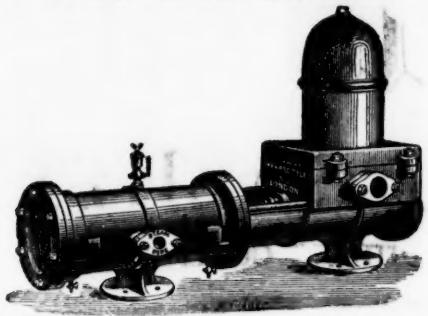
"6. Its greater steadiness and absence of jar and vibration experienced in other drills, which is very destructive to their working parts, &c."

"7. Its greater power is some FORTY PER CENT. in favour of the Ingersoll."

Medals awarded for several years in succession "For the reason that we adjudge it so important in its use and complete in its construction as to supplant every article previously used for accomplishing the same purpose."

Estimates given for Air Compressors and all kinds of Mining Machinery. Send for Illustrated Catalogues Price Lists, Testimonials, &c., as above.

HAYWARD TYLER AND CO.,  
SOLE MAKERS OF THE  
"UNIVERSAL" STEAM PUMP.  
OVER 7000 NOW IN USE.

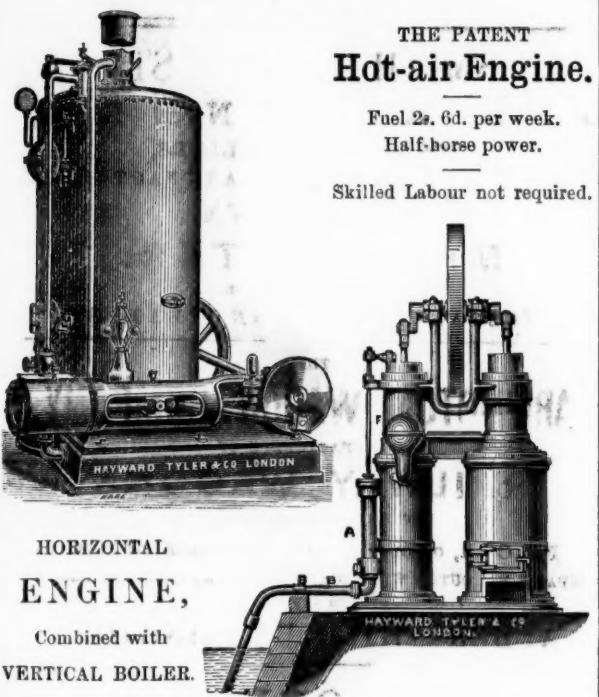


ADAPTED FOR MINES, COLLIERIES, AND BOILER FEEDING PURPOSES.

THE PATENT  
Hot-air Engine.

Fuel 2s. 6d. per week.  
Half-horse power.

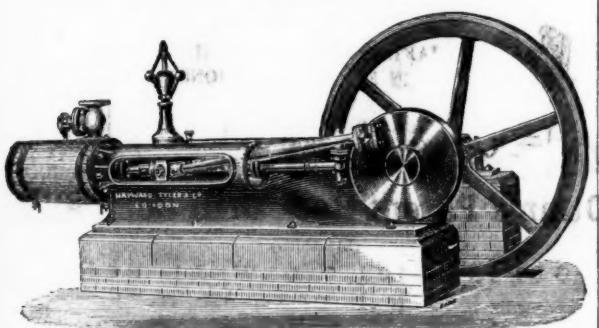
Skilled Labour not required.



HORIZONTAL  
ENGINE,

Combined with  
VERTICAL BOILER.

PUMPING GEAR OF EVERY DESCRIPTION.  
ECONOMY AND DURABILITY.



HORIZONTAL ENGINE,  
WITH RIDER'S AUTOMATIC CUT-OFF GEAR, ENSURING  
ECONOMY IN STEAM FUEL.

84 & 85, Whitecross-street, London.

HAND-POWER ROCK DRILL COMPANY (LIMITED).

IMPORTANT IMPROVEMENTS

APPLIED TO ALL EXISTING  
MACHINES  
AT COST PRICE.

RATE OF DRILLING  
GREATLY  
INCREASED.



PARIS EXHIBITION.—  
Special arrangements for visitors to the Exhibition have been made by the  
RAILWAY PASSENGERS ASSURANCE COMPANY.

For providing against  
ACCIDENT BY RAILWAY OR STEAMBOAT:

During the Journey to PARIS, and back.

A Premium of One Shilling insures £1000 if killed, or 6d per week if laid up by  
injury during the double journey.

POLICIES AGAINST ACCIDENTS OF ALL KINDS  
May also be effected for One, Three, or Twelve Months, on moderate terms.  
Apply at the Booking Offices of the Southern Railways, or at the  
Head Office: 64, CORNHILL, LONDON.

WILLIAM J. VIAN, Secretary.

THE NEWCASTLE DAILY CHRONICLE  
(ESTABLISHED 1786.)  
THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISING  
Offices, Westgate-road, Newcastle-upon-Tyne; 60, Howard-street, North  
Shields; 198 High-street, Sunderland.

# ORMEROD, GRIERSON, AND CO.

ST GEORGE'S IRONWORKS, MANCHESTER,  
Engineers, Millwrights, & Boiler Makers,

MANUFACTURERS OF

Stationary Steam Engines and Boilers for all purposes. Mill Gearing, Sugar Machinery, Cranes, Turn-tables, and Railway Fixed Plant of all descriptions; also, the Diamond Rock Boring Company's Plant—viz.: Compressed Air and Air-Compressing Engines, Prospecting Machines, Tunnelling Machines, and Shaft Sinking Machines.

## HYDRAULIC PRESSES OF VARIOUS KINDS

Have the Largest Assortment in the Trade of

PATTERNS,  
WITH MACHINE-CUT TEETH, OF

SPUR WHEELS, BEVEL WHEELS.

MITRE WHEELS,

ALSO

FLY WHEELS.

DRIVING PULLIES & DRUMS,  
CAN BE SUPPLIED BORED AND TURNED IF REQUIRED.

CATALOGUES ON APPLICATION.

LONDON OFFICES:

No. 5, WESTMINSTER CHAMBERS,  
VICTORIA STREET,  
WESTMINSTER, S.W.

## The "BURLEIGH" ROCK-BORING COMPANY (LIMITED).

100, KING STREET, MANCHESTER.

RICHARD MOTTRAM, Secretary.

For the Sale of the "Burleigh" Rock Boring Machinery; and also  
for Sinking Shafts, Cutting Tunnels and Levels, and General  
Rock Blasting Operations by Contract

References permitted to—

Messrs. BOLCKOW, VAUGHAN, AND CO. (LIMITED), Middlesborough.

" THE DOLLAIS IRON COMPANY (LIMITED), South Wales.

" THE EBBW VALE STEEL IRON, AND COAL COMPANY (LIMITED), South Wales.

" THE CRUMLIN VIADUCT WORKS COMPANY (LIMITED), South Wales.

" T. T. J. WALLER, Esq., Railway Contractor, Gisburn, near Skipton.

" TURNER AND SON, Limestone Quarries, Kiverton Park, near Sheffield.

CATALOGUES AND PRICE LISTS OF MACHINERY FORWARDED ON APPLICATION TO THE COMPANY'S OFFICE.

## STEVENS' PATENT UNDERGROUND WINDING ENGINE,

DESIGNED FOR USING COMPRESSED AIR OR STEAM,

SIMPLE, COMPACT, PORTABLE.

Silver Medal, Royal Cornwall Polytechnic Society, 1876.

No. 1 size, 7 in. single cylinder, with 2 ft. drums.

No. 2 size, 9 in. single cylinder, with 2 ft. 6 in. drums.

Larger sizes made with two cylinders.

A.—6 in. double cylinder, with 2 ft. 3 in. drums.

B.—8 in. " " 3 ft. 0 in. drums.

C.—10 in. " " 3 ft. 6 in. drums.

D.—12 in. " " 4 ft. 6 in. drums.

MANUFACTURED BY

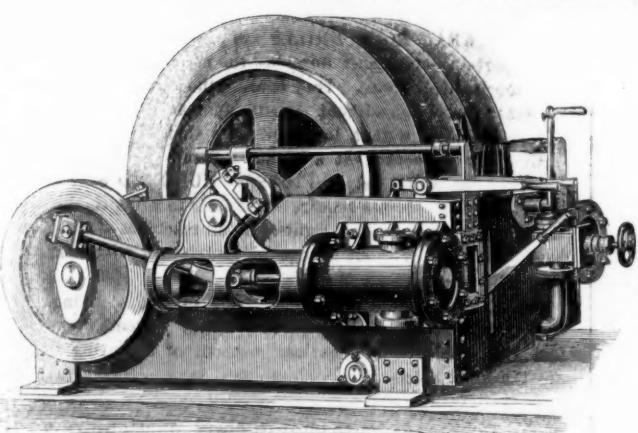
THE USKSIDE CO.,

ENGINEERS, MAKERS OF PUMPING AND WINDING  
MACHINERY, AND FORGINGS OF EVERY  
DESCRIPTION.

NEWPORT, MON.

Agents for the six Northern Counties—  
TANGYE BROTHERS, ST. NICHOLAS BUILDIN,  
NEWCASTLE-ON-TYN.

[This Advertisement appears fortnightly.]



BROADBENT'S

## Patent Improved Blake Stone Breakers.

GUARANTEED NO INFRINGEMENT OF ANY PATENT.

AWARDED PRIZE MEDAL,

In competition with the best-known Stone Breakers,  
September 7th, 1876.

Formerly Manufacturers for the late H. R. Marsden, having made  
for him in less than four years 336 Stone Breakers.

ESTABLISHED 1836.

Prices and particulars on application to the Patentees and Sole Makers—

ROBT. BROADBENT AND SON, STALYBRIDGE.

## Original Correspondence.

## PREVENTION OF FIRE-DAMP EXPLOSIONS.

SIR.—Referring to my advertisement relating to the "Solution of the Problem concerning the Prevention of Fire-Damp Explosions," published in the Journal of July 20, I may now give some further particulars as to the terms upon which I offer my invention to those chiefly interested, in order that it may be at once applied in those mines wherein fire-damp is generated. As my labour for 20 years has been bestowed upon the perfecting of this invention, I feel assured that if I now claim a certain material recognition of it the opinion will be general that it cannot be withheld. But it is only after the acceptance of the given terms, or after some modified arrangements have been entered into, that I can make known the precise details of the invention. Meanwhile, however, it may be noticed that I composed a treatise on this subject, in which I fully discussed the cause of the ill-success hitherto experienced in preventing fire-damp explosions; the method of procedure adopted in inventing a means of removing the peril of explosive damp; and, finally, a more minute description of the means by which explosions may be prevented. The reasons which led me to offer my invention in England were that it is an invention of the greatest possible importance for England on account of her vast underground stores of fossil coal; because Englishmen are very practical, and will easily find out the extraordinary advantages of an invention having for its object the securing the utmost safety of person, and not only a larger amount of work from each miner, but also a smaller cost of production; and, finally, because it must be quite indifferent to a practical man whether the successful inventor belongs to his own or to a foreign nation.

A few observations may contribute to the proper understanding of the subject. It is true that the prominent invention made by Sir Humphry Davy in 1812—the safety-lamp—rendered it possible, under necessary precautions, to enter underground places filled with explosive fire-damp, and it must also be acknowledged that much has been effected by introducing a more rational system of management in coal mines, yet the accidents caused by fire-damp explosions are even now so frequent as to prove that descending into coal mines wherein fire-damp is generated is still connected with great peril, and that hitherto fire-damp explosions could not be perfectly prevented. This problem, incontestably one of the most difficult in mining, is still waiting for solution. This solution has long occupied my attention, and after profound scientific study and the experience I have gained during a practical employment of 20 years in coal mines where explosive gases have existed, I have at length succeeded in discovering a mean by which in every degree of development of the damp an explosion can be prevented. This new invention is of great importance in saving life, and will also be of advantage to coalowners by increasing their profit by securing them a larger output at a smaller cost.

With regard to my remuneration for the invention, I am quite willing that it should be based entirely upon results; I offer it to any State or to the owners of coal mines in any State on consideration that an honorarium shall be guaranteed in proportion to the importance of the invention, such remuneration not to be paid until the practical value of the invention is demonstrated, but if the invention prove successful in practice the amount shall be paid punctually.—*Graz-in-Stiermark, Aug. 23.*

FRANZ WODICZKA.

## ROCK-BORING MACHINERY.

SIR.—I have no desire to enter into the controversy being carried on in the columns of the *Mining Journal* between Mr. Schram, "Delta," and others, but I think it necessary to put the engineering public and those interested in rock drilling machinery right in respect to one paragraph in Mr. Schram's letter in last week's Journal, wherein he states in Levant de Flenu, by Mons, in Belgium, "the Dubois and François and the Dunn machines bored 1 20 metre and 1 30 metre respectively, and the Schram 4 metres;" whereas facts really are as follows:—

Dunn's machine ..... 21 centimetres per minute,

Schram's ..... 13 and 14 "

Others averaged ..... 12 to 14 "

the consumption of power being nearly equal in all the machines. In conclusion, I may state that this statement may be verified by reference to the Commissioners' books, or to Mr. Mativa, Engineer to the Société Levant de Flenu, and others, who were present when the trials took place.—*Goswell Road, Aug. 28.*

W. W. DUNN.

## ROCK-BORING MACHINERY.

SIR.—As one interested only in the use, and not an inventor or maker, of rock-borers, permit me a few lines in reference to Mr. Schram's letters on this subject. I think he has himself to thank for the severe criticism he has encountered, because in this country it is not considered good taste in introducing what may be improvements to depreciate what has been done in the same line by previous inventors, nor to exaggerate the comparative advantages of your own improvements until they are proved to be such. Mr. Schram has been guilty of both these offences. At one of the meetings of the Institute of Mechanical Engineers I saw a block of very hard Cornish granite at Freeman's wharf pierced by a Darlington borer at the average rate of 5½ in. per minute, the highest speed of any hole being 7 67 in. per minute. Its success there, and the simplicity of the machine, caused me to advise its adoption at the Rushen Mines. You, Sir, published the manager's report, giving the details of sinking a shaft 24 fms. deep, showing a speed nearly six times, and a cost just one-half, that of the previous sink by hand-labour, and the same machines are now driving levels with similar results. I was, therefore, startled on reading Mr. Schram's pamphlet to learn that the machine we were doing all this work with not only "consumed more air, but did 100 per cent. less work than his." Even allowing full latitude, Mr. Schram must penetrate granite at the rate of 450 in. per minute to establish his statement; but, strange to say, in his published table, in last week's Journal, he gives 3 3 in. as his maximum, rather less than one-half that of the Darlington in its early days at the trials I have referred to.

*London, Aug. 28.*

FREDERICK J. KING.

## ROCK-BORING MACHINERY—SCHRAM'S DRILL.

SIR.—As Mr. J. Knowelden has joined the ranks of "Alpha" and "Delta," I would refer him, with regard to his remarks respecting my air compressor, which he states was used 35 years ago as an exhaust-pump, to my letter of Aug. 24, in answer to "Delta's" attack; but allow me here to ask whether Mr. Knowelden has ever heard the story of Columbus and the egg, and if so, knowing, as he should, how great has been the want of good air compressors, perhaps he can explain why neither he nor anyone else has tried to work out this construction for an air compressor? As Mr. K. evidently knows just as little about my air compressor as Mr. D., it might interest him to learn that I make my air compressors both with piston valves and with D slides, that I reverse my valve pistons or slides by means of a piston worked in a small steam cylinder on the top or sides of the large steam cylinder, that when double piston valves are used I have a valve face at each end of the small air cylinder, &c., with many other points which I have arrived at through practical experiments. Can Mr. K. tell me if any of these have been used in the exhaust-pump to which he refers?

With regard to the V-shaped wheel, which I only use for certain cases, there is nothing new in that, as there is nothing new in a common screw, but I should like to know in what machine Mr. K. has used a piston in the way I have it to act upon a break pressing against a V-shaped wheel. Mr. K. asserts that he has used this construction more than five years back. I have looked through the specifications in the Patent Office, and I find for 1871, Nov. 16, Dilnutt and Knowelden, patent for furnaces; 1874, Aug. 25, Knowelden, improvements in steam, water, or other fluid engines; 1875, March 24, Knowelden, removing hair from skins: in none of these specifications can I find anything relating to the V-shaped wheel, which, by the way, is used in every hair-brushing machine.

The twisted bar Mr. K. says "was invented and applied at least

14 years ago," and he says he himself has employed it. A great many inventors beside Mr. K. have employed it, and I fail to see why I should not have the same right to use a device which must be considered as public property, but the twisted bar does not constitute a rock-boring machine any more than a cylinder constitutes a steam-engine, or than a foundation stone constitutes one of Messrs. Dilnutt and Knowelden's furnaces.

It is impossible to detect Mr. K.'s motive for writing his letter, unless it is that he desires to make public that "the Payne machines were employed for exhausting, and not for compressing, air," or perhaps he claims the first construction of a V-shaped wheel and a twisted bar, both of which have been generally employed for ages.

I take this opportunity of expressing my thanks to Messrs. Oliver and Co. (Limited), of Chesterfield, for the unspared trouble they have taken with the working drawings for my air compressor, and for the great courtesy with which they have allowed me to make all the necessary experiments at their works. RICHARD SCHRAM.

*London, Aug. 28.*

## ROCK-BORING MACHINERY.

SIR.—Mr. Schram in his letter in last week's issue draws a comparison between his drill and others, and amongst them the Ingersoll is made as nothing compared with the Schram. It is not correct to say that the compressor at the Magpie Mine was not powerful enough to work the Ingersoll drill; it is, in fact, sufficient to operate several of them, and we were at one time in treaty with the owners of that mine to drive their level with our machines using the said compressor. Mr. Schram, like many men, evidently jumps at conclusions, and makes statements without first verifying the facts. An Ingersoll was at the Magpie Mine some time, but not working; as, when it was sent there on trial, it had been decided to let the work on contract, and the contractors used their own machine, and it was this machine that the compressor was insufficient for, and it was after that had failed that we made an offer for the drivage. If all the facts which Mr. Schram says he is prepared to prove are equally facts with this, much reliance cannot be placed on them. Referring to the trial at Flenu, through some misunderstanding as to dates, we were not represented there, but as we had several drills working in Belgium, it was deemed necessary that ours should be seen also, and for that purpose the party afterwards visited some extensive quarries where our Ingersoll and several other drills were at work, and the result of that visit was the sale of seven Ingersoll drills to the proprietors of that quarry. We can say nothing about the trial in Sweden, as we were not aware that any such trial had taken place until Mr. Schram mentioned it; but of one thing we are quite certain, that as regards consumption of motive-power our drill will compare favourably with any other drill now in use. LE GROS, MAYNE, LEAVER, AND CO.

*Queen Victoria-street, Aug. 29.*

## ROCK DRILL MACHINES.

SIR.—The long letter of Mr. Schram, in last week's Journal calls for a few words from me, as my name is mentioned by him. The action of the rock-drill patented by me in 1874, No. 3342, is identical in every respect with and prior to that of Mr. Schram, and when, therefore, the latter came to my notice in 1877 I pointed out this resemblance to Mr. Schram and to his agents, the result being the purchase by the former of my patent. The only part of his patent which in any degree differed from mine was the arrangement of the flanges, or valve faces, upon his valve spindle, for an object which I attained in a different, and I think a better, way. Machines made according to my patent worked perfectly well, and I sold it to Mr. Schram simply because, as I told him at the time, my more recently patented system, which I am now largely using, is so much less complicated and expensive, and in my opinion more effective and better. Be this, however, as it may, Mr. Schram bought the former patent on account of the similarity, amounting to practical identity, between the machine it describes and his own, as any of your readers will understand by referring to the two specifications.—*Southampton Buildings, Aug. 28.*

E. EDWARDS.

Engineer and Patent Agent.

## AUSTRALIAN TIN, AND EMIGRATION OF MINERS.

SIR.—The enclosed letter on "Australia as a Field for Mining Emigrants," I cut from the Cornish Telegraph. It has evidently been written by one who understands the question at issue, and forcibly illustrates the unreliable information so industriously circulated by your correspondent, "A Brisbane Resident." This "Brisbane Resident" has held out a false light all the way along the line. When the first discoveries of Australian tin were made he told us, through your columns, there was very little there, and for every year of their increase he had prophesied a decreasing production. As soon as they began to fall off in their enormous production, "A Brisbane Resident" commenced foretelling an increase; and now that the production has fallen to very unimportant quantities he has painted up such enormous discoveries as the world has never seen. This letter from the Cornish Telegraph, written by "A Fourteen Years' Resident," completely abolishes "A Brisbane Resident's" position, and shows that the information he has given us is of less value than no information at all. It also shows that the railway, which was to open up this world of tin, has actually been at work for many years, and that the heart of this frightful tin district has already been smelted. Is "A Brisbane Resident" dishing up for us a second time the accounts from the old papers of the years of the Australian first discoveries? It would almost appear that, as a modern Rip Van Winkle, he is now picking up for us the thread he lost in a former decade.—*Redruth, Aug. 22.*

W. TREGAY.

## AUSTRALIA AS A FIELD FOR MINING EMIGRANTS.

SIR.—In your last issue you published a letter from "A Brisbane Resident," speaking in glowing terms of Australia as being the land where miners, &c., might emigrate to with advantage to themselves. As I am of opinion that Australia is overcrowded with miners and unskilled labourers, I beg to make a few remarks on his statements. Byer's Town is spoken of as being near where the rich tin discovery has been lately made. This place is situated about 9° north of the tropic of Capricorn, on the road to the Palmer gold fields, on which 10 died, or were stricken by fever or ague, or both, to one that he termed his condition, and is one of the most unhealthy places in Australia, where, also, provisions are often at famine prices and water scarce: and, without water, tin (particularly alluvial tin) cannot be made marketable. The quantity in this rich discovery is about 5 per cent. of wash, which is nothing extraordinary, as thousands of tons have been raised in Australia of far superior wash, where the climate is good and water plentiful; and it is well known that the alluvium in that region is little better than gully-raking, and peopled by over 20,000 Chinese. No practical miners or engineers. I would inform "A Brisbane Resident" that practical miners have decided objection to work on the tin fields, simply because there is no mining there. Those who are employed, in 98 cases out of 110, have to work in the open air, with double-headed picks and long-handled shovels, at an average depth of about 10 ft., as everything has to be removed to get at the wash at the bottom which contains the tin.

Engineers are in no great request, Californian pumps are used in raising the water, puddling-machines to reduce it, and revolving-hoppers and sluice-boxes to pass it through—this finishes the whole process, and all who read this will easily understand what demand exists for engineers, and, further, if he knew anything whatever of mining he would say that there are as good miners in Australia as can be found in any colony or country where mining is carried on. "Half-dozen mining managers in this enormous colony." Has forgotten Stanthorpe, which place alone could boast of 40 less than five years since; that number is now reduced to two—the Brisbane and Herding-yards' Companies being the only companies at work; the other mines, as they were called, being worked out, or in the hands of Chinese, being unremunerative for Europeans. "Railways into the heart of Stanthorpe tin district."—The heart of Stanthorpe tin district has long since been smelted, and a railway opened from Brisbane to Warwick many years since, which is less than 35 miles distant.

"Cornwall v. all Australia." It is my opinion that the letters published in your paper by "Australasia," on alluvial tin and tin lodes, will be fully borne out, and that Cornwall will be a tin-producing county when there will not be a ton of tin exported from Australia. Copper mines: "We have no capital." What became of the capital subscribed by the Mount Perry and Peak Down's Companies? Was it not all expended, and the mines abandoned as unprofitable, except to a few who speculated in shares? These were the principal copper mines in Queensland. "Cloncurry rich as the famed Chilli mines." There is copper at this place at the surface, but whether it will form itself into payable lodes or not is more than any man knows, simply because it has not been sunk on. In Queensland and New South Wales there are scores of places where copper is to be met with at the surface. In sinking it generally dwindles away, as the country becomes hard, and is valueless, and tin lodes invariably follow the same rule.

If this country is to be proved capital must be subscribed for the purpose, or every one engaged must be possessed of money. This place is also miserably unhealthy, being covered with water half the year round, and is in the region where Leichhardt's expedition perished, and, later, where the expedition under Bourke and Wills shared a similar fate, saving one, together with their horses, camels, &c.

In the last rush to Mulligan's, near Byer's Town, the men were so poor that they refused to leave a steamboat at Cook Town, the law being powerless to eject them. On their arriving at the next port they were conveyed before the magis-

trates and committed to prison. More than 90 so treated were thankful for their change of circumstances, in having food and lodgings supplied to them. Letters similar to a "A Brisbane Resident's" are published by the interested few, who are not in any way troubled about the welfare of those whom they wish to induce to emigrate there. I would particularly request those who intend to embark in mining or unskilled labour in Australia to enquire of some friend respecting the position and hopes of miners and unskilled labourers. I contend that the demand is far in excess of the supply.

Fearing that my letter may be too long, I beg to conclude with the remarks of two English travellers in Australia. Messrs. Stanner and Trollope. Mr. Stanner says—"That any man who packs his son off to Australia without seeing him duly provided for, is as much guilty of that son's death, if it befalls him, as if he killed him by striking him on the head with a marlin-spike." Mr. Trollope says—"The Australian colonies are all 'blow.' But of all the blowing I ever heard in Australia during 14 years' residence there the blast of 'A Brisbane Resident' is the loudest."

A FOURTEEN YEARS' RESIDENT.

*Belgravia-street, Penzance, August.*

## PORT PHILLIP GOLD MINING COMPANY.

SIR.—Your correspondent, "Fair Day's Work for Fair Day's Wage," possesses better information than I, for I did not know that the explorations which are costing the shareholders so much are disappointing. I conclude from his letter that the quartz does not hold good in depth. If this should prove to be the case there must speedily be an end to the Port Phillip Company. Your correspondent's remarks on the expenses will doubtless be noticed at the next meeting. It is in every way objectionable to pay away 1000/- a year in London office expenses where "all the work is put out." What can directors, secretary, and clerk find to do? I would suggest that the Don Pedro Company's system be introduced—that is, three directors and one managing director, who is also the secretary. Something must be done, and this appears to me one good way of reducing expenses.

A SHAREHOLDER.

## RICHMOND MINING COMPANY.

SIR.—Mr. Lawrence T. McEwen, in his circular to the shareholders of the 23rd inst., has been pleased to make sundry reflections on my letter of the 10th inst., which I shall answer and send to the shareholders. With your permission I would place the following facts and figures before your readers, and perhaps Mr. McEwen may find in them good cause to pause in the expression of belief that the Richmond shares are worth from 20/- to 30/- per share. There are 54,000 shares in the mine, and at 20/- per share the market value of the mine would be 1,080,000/. How long will it take, judging from past results, to earn that amount in dividends, with the interest on the capital invested? The product of the mine during the past seven years has been about 200,000 tons of ore, which at the gross value of 12/- per ton represents 2,400,000/. Out of this large amount the shareholders have received in dividends about 324,000/, or 6/- per share on the 54,000 shares.

It will thus be seen how very large have been the losses in metal-smelting the ores, and how heavy the cost of labour, fuel, and general expenses. As it has taken seven years to produce 200,000 tons of ore from the mine, which have yielded the shareholders in dividends only 6/- per share, it is clear that it will take (by simple rule of three) about 667,000 tons of ore of the same value to pay 20/- in dividends, and fully 23 years to extract it. These 667,000 tons of ore, at 2 tons to the cubic yard, represent a volume of about 333,000 cubic yards. If the vein of ore averaged a yard square this would represent a body of ore nearly 200 miles long, or about as far as from London to Liverpool.

In America they expect to get their capital in mines back in three years, or at the rate of 33 per cent. per annum. In order to get back 20/- per share in three years the mine should be able to pay in dividends at the rate of 6/- 12s. per share per annum. The Richmond has paid in round numbers 6/- per share in seven years, that is at the rate of 17s. per annum. Taking the American standard of 33 per cent., this would represent the market value at about 21.11s. per share, or 21.9s. less than the par value.

In the beginning of 1875 I saw the shares of the richest modern mine on the Pacific Coast—the Consolidated Virginia—at 30/- per share, or 16,200,000/- for the whole mine. To-day the shares are at 2/- and under, and the ore is said to be exhausted. The shareholders who bought at 30/- have received about 16/- in dividends, so that they are out of pocket 12/-, plus the interest on their money.

The Eureka Consolidated, adjoining the Richmond, developed in 1874 a wonderful breast of the most beautiful yellow carbonate and molybdate of lead ore. It shone like gold; experts raved about it, and the shares jumped up from 3/- to 15/- in no time. Then the knowing ones slipped out, the ore gave out almost like flash, and the shares rapidly fell to 3/- again. Richmond shareholders will have only themselves to thank if they are misled by speculative market quotations of value rather than be guided by the sober facts of the past series of seven years.—*Aug. 30.*

R. M. BRERETON.

## RICHMOND MINING COMPANY.

SIR.—As Messrs. Brereton and Bayliss have relieved themselves of further risk in the Richmond Mines, by selling the bulk of their shares, I think it will tend to the interests of the present shareholders to ask them to desist from writing their alarmist epistles till Mr. Probert has had the opportunity of replying to the charges laid against him. The result of their writing (whether intentional or not I will leave) has created alarm and panic amongst the shareholders, thereby running down the price of the shares from 13½ to 7½, a reduction of nearly one-half. I would advise the shareholders to be a little more calm, and not sacrifice their capital upon mere speculative rumours, which in many instances are set afloat for a purpose, but wait for a full and authentic report of the affairs of the mine from the directors. At the same time the directors might have given one word of assurance before things had got to this pass. If the 20,000/- profit realised monthly for twelve months past (as stated in a circular from Mr. McEwen) be paid in dividends, I think the shareholders will have reason to be satisfied with their investments.

ONE HOLDING ON.

## THE RICHMOND CONSOLIDATED MINING COMPANY.&lt;/

ceiving 1000/- from this company for a report on their property he should return to England and attack the value of that property in the columns of the *Mining Journal*. Where is professional feeling gone, or where can any confidence be placed in future by shareholders in sending an engineer to report on their mines if he, on his return, reports in the columns of the newspapers his opinion of their property, either good, bad, or indifferent? As regards the other members of your committee—Messrs. Bayliss and Fulbrook—I think it would have been fairer if they had made known to the shareholders all they knew in disparagement of the property immediately on their return, and not immediately after disposing of their shares, as I am credibly informed they did. In conclusion, I do hope the shareholders will take care of what I am sure is a most valuable property, and not allow it to be ruined by interested parties as nearly all the other English properties in America have been, and that they will endeavour in future to be represented by people who will at least let them have—

FAIR PLAY.

## RICHMOND CONSOLIDATED MINING COMPANY.

TO THE SHAREHOLDERS.

SIR.—My attention has been called to a letter circulated amongst the shareholders, signed Lawrence T. McEwen, dated Aug. 23. Mr. McEwen has not had either the courage, fairness, or courtesy to send me a copy, and I cannot charitably consider the omission unintentional, inasmuch as he has further omitted to send a copy to my brother, who is also a shareholder. Mr. McEwen says he received my circular late on Friday evening, and his reply being in the hands of London shareholders early on Saturday morning, it is evident much midnight oil was consumed in its composition, in setting up the type, in printing, folding, addressing, and posting his letter to about 700 shareholders. The rapidity of his movements in thus giving us his "night thoughts" is so remarkable that shareholders are now writing to enquire "Who is Mr. McEwen?" and doubtless all are curious to know why this sudden manifestation of nocturnal energy on his part? Why the intense mental anxiety under which he has evidently written? Is the circular published *bona fide* in the interests of the shareholders, or wholly and solely in his own? Is he speculating for a rise in Richmond shares, and frightened out of all propriety by the "recent depreciation"? These questions naturally arise from the nature, tenor, and circumstance of his first contribution to Richmond literature, and I doubt much if, even in his own mind, "the (Friday) night's excitement" has been able to bear "the morning's reflection," for he has evidently written in anger, and as a very disappointed man might be expected to write if he had "burnt" his fingers.

Mr. McEwen having thought proper (apparently in pursuit of his personal interest) to impugn my conduct and motives, I may tell him that my character and antecedents, and also every act of mine in connection with the Richmond Company, will bear (and not suffer by) comparison with his own; and I am sure the majority of shareholders who differ with me in opinion do me the justice to believe that I have been guided throughout solely by what I have considered, rightly or wrongly, the interests of the shareholders. I have had an abiding interest in the company for two years, and throughout all the fluctuations in price, from 3½/- to 14/- and down again to 8/-, have held persistently to my shares. Mr. McEwen's interest has been limited both in time and amount; he first became a shareholder in June last, has never held by the register more than 325 shares, and holds now only 225, having transferred 100 on July 24; his interest, therefore, does not appear abiding but fluctuating. What his operations may have been since that transfer was made or what they now are I cannot say, but his circular is very suggestive.

Since my appointment as a member of the committee of investigation, and since the labours of the committee were concluded, I have been applied to very frequently for advice as to buying or selling shares, but have uniformly declined to express any opinion thereon, on the ground that I never advise as to investments in companies in which I am personally interested. Can Mr. McEwen say he has not given such advice, or deny that he has been most active in influencing others in this respect? Thus much as a brief comparison between Mr. McEwen's status and my own in Richmond affairs. It is strange that, notwithstanding my "apparently endless circulars," Mr. McEwen should attack the only one that on the face of it conveys my earnest hope that it would be the last, and that I am sick and weary of Richmond work. Is this to be accounted for by great personal interest in a rise in the value of the shares at this particular juncture, or does he think he may attack me without fear of reply? If so, he must understand that though I have neither heart nor strength for continued controversy on the affairs of a company which are beyond my strength to control, he will not be permitted with impunity to attack either my character or motives. My object in writing was not to "create considerable alarm in the minds of shareholders," and it is evident I have not done so, but to state frankly and without concealment (for there has been too much of that already) the reasons for my contemplated retirement. It is not for me to become Mr. Brereton's champion, he can defend himself, and he has already publicly explained that he sold his 25 shares on July 17, before he obtained the information from the Eureka papers which induced him to write his first letter; and states explicitly that he sold on reliable information from Eureka, "that the Richmond bonanza was nearly exhausted, and that unless new ore bodies were developed there would not be enough ore to keep the three furnaces running over this month," and we have since received a cablegram from Mr. Probert saying the furnaces will be shut down for repairs on the 31st instant. The register will show that "friends of members of the committee" form but a very small minority of those who have sold shares the past two or three months, and I have friends who, in my opinion, have unwisely purchased during this period. Mr. McEwen's statement that the large sales thus made and the unfavourable rumours will fully account for the recent depreciation, "equal to about the entire capital of the company," is a manifest absurdity, and shows that he is not only young as a shareholder, but very young in Richmond experience, and he will probably find, when perhaps too late for his profit, that the recent depreciation has been fully justified by existing causes and events. In this case there may be a special interposition in his favour, and for the general good I hope so.

The next five paragraphs show that I and Mr. McEwen, up to a certain point, adopted precisely the same measures in order to reassure our minds with reference to Mr. Brereton's letter. It appears the second letter he received from the secretary was so unsatisfactory to him that he communicated with the legal adviser of the company, and was then satisfied. I did likewise, but was not satisfied, and therefore consulted my own solicitors, laying before them extracts from the by-laws of the Nevada corporation, and also a copy of the proxy, unlimited as to time, given by the English directors, empowering Mr. Probert to vote at all special and general meetings of the Nevada company in respect of all the shares (10,995 out of 11,000) held by English shareholders in the Nevada corporation! It is very probable Mr. McEwen has never troubled himself to look at those documents, and if not he had better do so, and "read, mark, learn, and inwardly digest them," before setting himself up as a safe or reliable authority and guide on Richmond affairs. As a result of the efforts to reassure my mind two courses remained open to me—1. To continue my stake in a company in which my confidence was severely shaken, involving me in further anxiety and apparently endless work, for which my state of health unfit me; or—2. To sell my shares, and formally withdraw, as far as possible, from all further action in reference to the company's affairs. My legal and medical advisers and best friends strongly urged me to adopt the latter course, and, having so decided, I thought the manly and straightforward plan would be to communicate my intention to the shareholders, the majority of whom had entrusted me with their proxies for the late meetings, and to state honestly my reason for such withdrawal. Had I omitted doing this Mr. McEwen (if it suited his own purpose) might possibly have penned a midnight circular complaining that I had withdrawn from the company by the back door and left in the lurch those who had been supporting me, and sold my shares without saying why or wherefore, and doubtless he would have asked—"Is this right?"—"Is this just?" Judging from Mr. McEwen's circular, my conscience is a much safer guide and mentor than he is as to what is "right" and "just." I have done what I deemed "right" and "just," and, fortunately, have not suffered thereby as I might have done; the facts, however, are not as stated by Mr. McEwen, but entirely the reverse; and there is no reason why Mr. McEwen or the shareholders to whom he appeals should be kept waiting until the next meeting to hear what Mr. Bayliss, as the holder of ten shares, has to say for himself! Thank God I can speak now.

My announcement to the shareholders was not that I had sold my shares, but that I "have decided to sell my shares," the fact being that I resolved not to sell them until after I had written to the shareholders—and I did not do so. This determination, to a speculative mind and temperament like Mr. McEwen's, may seem very Quixotic, for such a spirit of fair and honourable dealing does not appear to have occurred to him as a possibility, as he utterly ignores the course of conduct I had marked out for myself, and which was clearly expressed in my letter, and solely on an assumption of his own, not having the slightest foundation in truth or fact, he attributes to me a course of action I never even contemplated, and then impudently asks—"Is this right?"—"Is this just?" Further, it is not true that I have sold my shares at about 10/- per cent. premium, or that I have sold them on knowledge acquired from my exceptional position as a member of the committee.

After two years of hard work and anxiety I have as nearly as possible recovered the sum originally invested, but no more, and I trust Mr. McEwen will be equally fortunate when he closes his "book" and account in Richmond shares. If I had the statement on better and more reliable authority than Mr. McEwen's it would be consoling to know that my interest in the company will not suffer by my withdrawal from all further active participation in its affairs; and it is specially gratifying to feel that I have been able to withdraw and sell my shares without adding in the slightest degree to the "recent depreciation," so that whatever sins of omission or commission may be laid to my charge by such earing and unreliable critics as Mr. McEwen's, I shall, at all events, be exonerated from that. Mr. McEwen speaks now somewhat contemptuously of the work of the committee. This is in strange contrast to his previously expressed views; but there is one fact which thoughtful minds do not forget—that the company has been in existence seven years, that during the six years up to August last, when the committee of investigation was appointed, the shareholders had received only 3½/- per share in dividends, and that during the past twelve months, since the appointment of the committee, they had received 2/-, 12s. 6d. per share! Mr. McEwen may possibly argue that this is mere accident—it is nevertheless a fact! It may be a "crumb of comfort" to Mr. McEwen, if he is a great "bul" of Richmond, to know that it is just possible I may meet him at the next meeting, holding not only ten shares, but a much larger stake in the company than he has, or I understand the directors are taking steps to secure all controlling power to the English shareholders, and if they do this it will be a first step to a reformed administration, and I shall not hesitate to reinvest in a mine that I believe intrinsically good; but whatever my holding may be, large or small, I cannot possibly undertake further work in the interests of the company, and shall only attend the meeting to say as few words as possible, and to vote and do according to my conscience what is "right" and "just" after we get Mr. Probert's defence, and I may now add to accept any and every challenge of my conduct that may be made by Mr. McEwen or any other shareholder.

In conclusion, I am bound to say that I cannot concur with Mr. McEwen in the rosy view he takes of the various points referred to in his last paragraph; and I venture to say he will ultimately be found wrong on all points, except as to the

intrinsic value of the mine itself. It is a pity he did not devote his night of labour to giving us some details of the "special advices recently obtained" by him, as in the absence of such details, and having before me the misleading statements in his letter, I can only accept his assurances on this material and important point *cum grano salis*, and other shareholders will do well to exercise the same degree of caution.—Victoria-street, Westminster, Aug. 27.

JOHN BAYLISS.

## RICHMOND MINING COMPANY.

SIR.—In correcting Mr. Brereton's statement as to the amount of information given to the shareholders respecting the Nevada Incorporation I quoted from the proof copy in my possession of the document sent out in November, 1873, in which the number of shares was given, but I find on enquiry at the office that this item was omitted in the print forwarded, and that it was left to me to make the fuller statement in my remarks at the meeting, so that the shareholders were informed of the details through the papers sent to them, though it was mistake on my part to say that "the number of shares was given in the circular."

I had nothing to do with fixing the price to be paid for the property. The Articles of Association and the prospectus were in type before I heard of the company, and at the time the investigation insisted on by the board took place the extraordinary developments in the Eureka, close up to the Richmond boundary, as well as in that mine, had created a justification for completion of the purchase. The matters in connection with the original statements, and the condition of the mine at the time of actual sale, were fully discussed at the public meeting in 1872 on Mr. Probert's return from his first visit of inspection, so that the shareholders were fully informed of all that had passed, and they endorsed the action of the board, who, notwithstanding, insisted on the vendors paying the cost of obtaining the Tiptop Mine, and Mr. Hopkins and myself spared no time or pains to ensure that result, and I have always entertained the belief, which is now stronger than ever, that that acquisition will prove at least as valuable as the original Richmond.

Mr. Brereton disputes my statement that in respect to the Nevada Incorporation (through which, by the holding of 10,995 shares out of the 11,000 constituting that company, the Richmond Consolidated Mining Company (Limited) has such overwhelming interest in all the properties in the hands of the American Richmond Company) the English Richmond Company is at present "endowed with a power which for all practical purposes is ample and absolute," the reason assigned by Mr. Brereton for denying my statement being because "the directors have given Mr. Probert their proxy for the 10,995 shares," and then he goes on to say what extraordinary power of control this gives that gentleman over the Nevada Incorporation.

Mr. Brereton thus unconsciously proves my case. Mr. Probert is part and parcel of the English board, and on the well-known axiom

"Qui facet per alium, facet per se"—it is that body, the representative of the English shareholders, which, through one unanimously elected and fully trusted by them, exercises the very power which, I repeat, for all practical purposes is "ample and absolute." On the supposition that Mr. Probert might, if shabbily treated by the English shareholders or unfairly dealt with by the board, make an unjust use of the power placed in his hands, which his co-directors could withdraw at any moment if they were unwise enough to do so under the present state of affairs. It is very easy to make out a case for distrust, just as it is possible to do so in the instance of every trustee, executor, bank manager, or merchant's confidential agent. No business can be carried on without risk of loss from misplaced confidence. It is a contingency that belongs to human nature, but it is due to Mr. Probert to state that after six years' experience in connection with his transactions at the mine the board were unanimously of opinion that he had earned and merited their absolute confidence in his integrity, and I now state my conviction that, however badly he may consider himself to have been treated by the committee, he would not dream of making that an excuse for betrayal of the trust placed in his hands.

Mr. Brereton has overlooked in his researches a fact, which is the key to the evidence of Messrs. Probert and Wren, on which he lays such stress; that fact being that the Nevada Incorporation only deeded over to the London Richmond the three mines for which patents had been obtained, all the other located properties were obtained direct by the "Nevada Richmond," and remained in its hands, and in was in reference to these locations that the contest arose with the Eureka Consolidated Company. The step taken of reconveying the patented properties to the Nevada Incorporation was done under the highest legal advice for legal and mining reasons of the greatest weight, which it is not politic to discuss in public.

Mr. Brereton asks why the board did not adopt Mr. Benjamin's advice to obtain an Act of the Nevada Legislature to enable aliens to hold and inherit property in that State, and then Mr. Brereton says that "he believes such Act could have been obtained when the said Legislature met in 1874-75." Mr. Benjamin's advice was not given till 1876, and then at a time when a legal contest was going on, which is not yet ended, involving consequences of the deepest moment—a position which the committee of investigation choose virtually to ignore in judging a concern carried on in the midst of war by the stringent rules only applicable to a time of peace. Even supposing that the Nevada Legislature would have passed an Act to favour foreign companies, that would not be the only act necessary to relieve them from other serious disadvantages within my experience, and I retain the opinion that the formation of the Nevada Incorporation was not only the wisest but the safest possible course that could have been devised under the circumstances, and that there is not the slightest real ground for any apprehension in regard to the title. It may be "sentiment to say there is, but it is not business."—Aug. 30.

JOHN ELLIOTT.

## MINING IN NORTH WALES, SALOP, AND CARDIGAN.

SIR.—One of the most interesting articles in the *Mining Journal* is the report from the above districts, at least to mining men resident therein. The writer has a most intimate knowledge of his subject, and his criticisms are just and fair. There has been a great deal of correspondence with regard to the Llanrwst district, which is calculated to lead the public to believe it is a veritable El Dorado, but your correspondent's remarks only give tone to private information. I have received to the effect that the Gorse Lode reported to be so rich is an immense hungry vein containing a few fine specks of lead, but scarcely sufficient to pay for crushing. However, as the wheel and crusher are near completion we shall soon see what it contains. What has become of Capt. Knapp's Llanrwst Mine, and is he carrying out his oft repeated assertion about sampling "100 tons per month for years to come?" I noticed one remark with regard to the Van in your correspondent's letter to the effect that the leadstuff on the whole is poor, but it was owing to the perfect system of treatment carried out by Capt. Williams that the mine made so good profits, and I would ask whether a system could be considered to be perfect (although asserted over and over again by Capt. Williams to be so) which allowed the pile of skimpings to accumulate to the extent and value it did, and necessitating an outlay of some thousands in a separate arrangement and plant for their treatment? A "perfect" system should have included this in the first instance.

The remark as to the *ipse dictum* of mining captains is good, and a new arrangement is very desirable under this head. Men are selected with scarcely any qualification (but that their father's uncle or some other relation was a mine captain, or he himself thinks he knew tin and lead, too) to manage mines, and without the slightest knowledge of mechanics and engineering are allowed to spend money in the erection of obsolete appliances, and the maintenance thereof. Even allowing that they know how to open and work a piece of ground properly from their own long experience it does not follow that they can erect the best machinery in the best and cheapest manner for the various requirements of the mine. Engineering is a separate branch, requiring a different training. As an illustration of this I will take a well-known mine in the county of Cardigan, which I will call D. The agent has been selected because a relation is a well-known captain who was deposed some years ago from the management of a large concern for certain irregularities in the cost-sheets, and who has since managed several unsuccessful bals, which have absorbed a large

amount of money, and will continue to absorb. The agent of D has been selected by no other standard than this—at this mine a certain piece of machinery is erected and put to work by an engineer, and so long as the said engineer has the charge of it it answers admirably, but whenever this machinery is left to the care of the captain it is reported in less than a week as being too weak. The causes are examined into, and it is discovered that owing to the want of cleaning and lubricating one half the power is wasted in friction. This fault is corrected, and the matter pointed out to the captain; but in another week things are again condemned. Compare this "captain's" knowledge with the careful arrangements of Messrs. Landis to prevent heat, and consequent friction, in the bearings of their improved portable engines, and the formula given showing the great loss of power by friction. The great mystery, however, is that the London manager and directors place implicit reliance on this ignoramus, although if they only asked him the simplest questions as to the amount of power he required to overcome the work he could not tell. The cost of sinking the engine-shaft at D, including extras for the last draught, has been something like 50/- per fathom. So much for this captain. At another mine in the neighbourhood the captain reported that he "intended filling the new reservoir, when he would be able to judge whether the dam was strong enough." He filled the reservoir accordingly (and will it surprise engineers?) and the captain is now able to judge whether the dam is strong enough, as it has been washed away, the greater part of an extensive plant has been swept down the valley, and the mine deluged. This, too, by a comparatively small store of water, not by one of the magnitude of the Sheffield reservoir. The London management of these two mines have had some of the finest properties, but have never paid much in the shape of dividends. The reason is not far to seek. It is their implicit reliance in the tut "captain," no matter how, when, or who; but "captain" is the standard. ENGINEER.

## CORNISH FELSPAR.

SIR.—In these days of extreme depression in all centres of manufacturing industry, and of distrust in many undertakings as far as any idea of making an investment is concerned, it affords pleasure to be in a position to call attention to a most important discovery in the parish of Roche, in Cornwall, of a bed of felspar of great extent, and of a most valuable character. From an analysis before me its constituent parts are as follows:—Silica, 63·17 per cent.; alumina, 20·89; peroxide of iron, 0·14; lime, 0·90; magnesia, 0·21; potash, 11·48; soda, 3·11: total, 94·90 per cent. The above analysis was made by Mr. Pattinson, of Newcastle-on-Tyne, and shows it to be a very valuable article. The bed is laid open for a great distance, and already at least 250,000 tons are proved to exist. One cargo has been recently sent away, and competent judges have pronounced it to be superior to the felspar from Sweden, whence hitherto our supplies have been drawn. It will prove a source of great wealth to the fortunate owners, for the demand will doubtless amount to many thousands of tons per annum. Sales have been effected at 12·10s. per ton, but its value is quite 2L, and it can be put f.o.b. for 13s. 3d. I consider that the waste chippings or snails which may result from its preparation for market to be valuable as a flux from the large quantity of alkalis contained; this would be worth nearly 20s. per ton to ironmasters, and I think with a little persuasion many could be induced to use it.

ONE WHO KNOWS THE FELSPAR DISTRICT.

## BOTALLACK MINE.

SIR.—The directors of this historical old mine are determined to be alive to modern progress, and not to allow their riches to remain in the ground for future generations to profit by them. At a meeting of the committee at the mine last week it was pretty well decided to use the boring machine in their levels, leaving it to be discussed afterwards the time and place to commence operations. This will be the means of opening up ground in the mine, which gives indications of rich deposits. Both in committee by Capt. F. Bonse, and afterwards by the purser of the mine (Mr. Stephen Harvey James), a point blank question was put to Capt. James Thomas, the tin dresser, as to what stamping power they should adopt in the event of the boring machines augmenting their yield. He replied without hesitation that from his experience of the old and new stamps that he should at once adopt Scholl's pneumatic with a view to economy, quantity, and quality. The question therefore, coming from a man who has passed a lifetime on the stamps floors, as to the "stamps of the future," appears to be settled.

VIATOR.

## OLD TREBURGETT MINE.

SIR.—It is gratifying to learn that a company is forming to re-work this mine; for although in the last working it proved a failure, and the poor men suffered in consequence, yet I do not hesitate to say that if the mine is worked in a legitimate manner there is no need to fear of the ultimate results. One great item of importance is that the pumping and winding machinery is actually on the mine, as also is the crusher; as to the dressing-floors, they will cost but little to get all right again. Not long since a gentleman put this question to me—if you had 1000/- would you take up a share in this mine? My reply was, if I had 1000/- I would venture 900/- of it in Old Treburgett; and I hope soon to see it started again.

A TOURIST.

## OLD TREBURGETT MINE.

SIR.—In last week's Journal there is a letter headed "Old Treburgett Silver and Lead Mine—Great Excitement at St. Teath," and signed by "Observer." This is no doubt done by some of the same clique that belong to the party who signed themselves "Miners of the Old Treburgett Mine," in the letters that appeared in the Journal in December and January last, only another name sent you, and done with no other motive but to try to damage our reputation as agents of Old Treburgett Mine. The letter is again simply a tissue of misstatements. The report of the proceedings in the Camelford County Court, on Thursday week last, was fully reported in the local papers a day or so after. But now, by the statement forwarded to the Journal, we have the facts quite reversed. We all know it is a hard case for men to lose two months money, and we, as agents, are with them, and I can assure you I have tried every means to get our money. In September last, when the mine was in liquidation, and no pay, I had advice from Mr. Marrack, solicitor, of Truro, on the matter, and found from him that we had not the least chance of getting a farthing; and as to our advising the men to sue the executrix, it is like all the rest they have written about the mine and us, and, as I before stated, done entirely with a view to damage us. We never thought we ever had any claim against the executrix, or, at least, I never did; but by promises made by Mr. S. Tucker a great many thought they had a claim on him for it, and he was the party a good many thought ought to be sued, but it was proved in Court that he had no authority to act for his father about the mine. Then again, the statement about my evidence in Court (I was subpoenaed by the men), which was all but over when I was sent for, and the Judge stated he should like to ask me a few questions, which were as follows:—1. How long

that a man was at a "pub" in the village on Sunday week, in the afternoon, drunk, with a lot of boys around him. What they are doing in getting statements put in papers is injuring themselves and the district. No doubt they are prompted by a certain man that has made a lot of money out of the mine, and done nothing for it, and who ought to know better. No mine agent in the county has been more kind to men than I have, and I can only say that all able miners have always got 10s. or 15s. a month more in this mine than in any other in the county, and as their boys came in they were put underground with them. Now, what say your readers after this? Is it not cruel to have such assertions put in letters by interested parties? I send you these few lines as facts, as I always object to reply to anonymous letters.

As to the prospects of the mine, I shall for the present say nothing about it; time will prove that.

WM. HANCOCK.  
St. Kew, Aug. 27.

#### PESTARENA GOLD MINING COMPANY.

SIR.—I have received the report of the meeting of the Pestarena Gold Mining Company, which gives the unfortunate shareholders of this formerly much mismanaged company some hope that under Messrs. Taylor's judicious directions some good may come of it yet; evidently the late Dr. Frankfort and his colleagues had undertaken what they did not understand, and no doubt much of the shareholders' money must have been uselessly spent, and perhaps not very lawfully. The mine expenses seem very heavy compared with the receipts, but I suppose Messrs. Taylor are obliged to take money from revenue for opening up the mine, putting up machinery, &c., which they have no means of obtaining otherwise. Reference is made to another old mine on the opposite side of the river, which they are pumping out, and the report refers to a Speranza Mine and a Morghen adit kept open. Is this another intended long tunnel like the now famous Sutro tunnel in America?

A SHAREHOLDER.

[For remainder of Original Correspondence, see to-day's Journal.]

#### FOREIGN MINING AND METALLURGY.

In the French department of the Haute-Marne the demand for iron has been extremely moderate, and working operations have been restricted so as to prevent an accumulation of stocks. Prices are already very low, but to prevent a further decline in quotations the only course open appears to be to reduce the production. There is rather less depression in the foundries than in the forges; pipes are quoted at 7d. to 7d. 4s. per ton. In the Nord first-class merchants' bars have made 6d. to 6d. 4s. per ton for small lots, with a scale of 4s. per ton per class. In the Loire-et-Rhone group there has been very little business doing, purchases being only made from day to day. Ordinary iron is quoted at 7d. 4s. per ton, but this quotation is only nominal. The steel foundries appear to fare somewhat better than the forges in the Loire-et-Rhone; the construction workshops are complaining of a scarcity of orders. In the Meurthe-et-Moselle No. 3 pig is priced at 2d. 18s. 4d. per ton for small lots; pig for refining has been somewhat better sustained.

It appears from an elaborate report prepared by M. Leblen, Engineer-in-Chief of Mines in the French Department of the Nord, that the production of coal in the Valenciennes basin experienced a sensible reduction in 1877, having declined from 3,376,114 tons in 1876 to 3,289,516 tons last year. The cause of this contraction in the production last year was the general depression of European industry, and especially the dulness of the iron trade. In 1868 the production stood at 2,411,829 tons; it attained its maximum in 1873, when it amounted to 3,437,241 tons. The number of persons employed in coal mining industry in the district last year was 21,133, as compared with 21,652 in 1876, and 20,600 in 1875. Wages were reduced last year to the average extent of 3d. 12s. per man, or about 9 per cent.; this was due to an introduction of short time more than to any other cause. The selling price of the coal raised fell last year to the more marked extent of 15 per cent., so that profits were smaller than before.

The Belgian coal trade has presented scarcely any change. In the Mons basin business has been done upon a very restricted scale, and prices have continued feeble, although they appear to have fallen to the lowest possible point. The Charleroi basin has received some orders for the domestic qualities of coal at rates which do not indicate any great improvement in quotations, at least not to the probability of any further fall taking place. This is a point of some little importance, and there are hopes of a slight revival in quotations during the ensuing winter season. At Liège the coal trade remains *in statu quo*; business has been limited, and prices have remained without variation. The autumn contracts for coal for the Belgian State Railways will be let at Liège and Charleroi on Sept. 5. The Serre and Magrave United Collieries Company has purchased the Oewelais and St. Roche Collieries. The extent of these collieries is 930 acres, and the sum paid for them was 14,080.

In 1877 the French department of the Nord produced iron and steel as follows:—Refining pig, 174,478 tons; merchants' iron, 134,582 tons; rails, 10,976 tons; special irons, 60,082 tons; plates, 24,674 tons; and Bessemer steel, 29,984 tons. The corresponding production in 1876 was:—Refining pig, 148,662 tons; merchants' iron, 111,735 tons; rails, 19,746 tons; special iron, 46,352 tons; plates, 18,904 tons; and Bessemer steel, 20,835 tons. The prices of all these articles were sensibly lower in 1877 than in 1876, one effect of this was a decided increase in the production. Contracts have just been let by the Eastern of France Railway Company for 10,000 tons of iron rails at an average of 6d. 6s. 3d. per ton; in January this year the same company let a contract for a smaller quantity of steel rails at an average of 6d. 13s. per ton. Prices have thus declined during the last seven months to the extent of nearly 7s. per ton.

Most of the Belgian works have now employment assured to them for some months, thanks to contracts recently let for the Belgian State Railways, and thanks also to some contracts for Bessemer steel rails and tyres of fine-grained iron obtained on foreign account. If the prices at which these contracts have been secured are comparatively unremunerative, at any rate the contracts have enabled the proprietors of Belgian ironworks to utilise the services of their working staff while they are awaiting a more decided revival in business. The Zone Forges Company has decided to close its operations; on the other hand, the Hourges Company is about to light a second blast furnace. Considerable quantities of Belgian iron continue to be dispatched to England. During the last 18 months the Acoz Forges Company has forwarded to London, as well for local consumption as for re-exportation, 7,282 tons of iron of various kinds. The Thy-le-Château Company has invited several engineers and industrials to assist at a trial of a Pernot-Ponsard furnace for the production of steel.

**MINERAL WEALTH OF AUSTRIA.**—The Mining and Smelting Department of the Imperial Ministry of Agriculture at Vienna have just published an interesting Notice of Some of the Principal Mines of Austria, prepared by Mr. CHARLES D'ERNST, for the purpose of explaining the admirable collection of minerals, mine products, and plants sent to the Paris Exhibition. The pamphlet contains an interesting account of the mines and smelting works of Przibram, in Bohemia, from which specimens of the veinstuff, ores in various stages of dressing, as well as lead litharge, cupelled silver, refined silver, and so on. The sketch of the history, geology, working, and works at Przibram adds much to the interest of inspecting the collection, and similar details are given with regard to the Joachimsthal silver, bismuth, and uranium mine in Bohemia. The block of uranium exhibited from this mine is especially worthy of notice, and there are also some excellent specimens of uranates of sodium, potassium, and ammonium, and of vanadic acid and vanadate of ammonia from this mine. Of the quicksilver mines and works of Idria (Carmiola) long accounts were published some years since from our esteemed correspondent—Mr. Plamnek, and they are very fully treated of. With regard to the mines and smelting works of the Greek-Oriental Ecclesiastical Foundation of the

Bukowina, it should be mentioned that there is a large number of excellent specimens of manganese, and also some fine samples of spiegeleisen and ferro-manganese. The surveying instruments exhibited by Mr. E. Schneider, of Währing, near Vienna, are really masterpieces of good workmanship, and Mr. d'Ernst has given them full credit. The pamphlet will be extremely useful to all visiting the collection.

#### ROYAL CORNWALL POLYTECHNIC SOCIETY.

The forty-sixth annual exhibition of the Royal Cornwall Polytechnic Society opened in the Polytechnic Hall, Falmouth, on Tuesday last, under the very practical presidency of Mr. Richard Taylor, F.G.S., who took occasion in his opening address to make some very valuable and practical remarks upon boring machinery, of which his firm are among the most notable employers. Regarded as a whole, the exhibition was one of unusual merits. Fine arts never were so strong; the natural history was far in advance of recent years; photography was quite up to the mark, and although mechanics were not represented so strongly as last year, the average was still well maintained, although some of the articles entered, such as Mr. Darlington's rock-borer, failed to arrive in time. We append a notice of the chief mechanical exhibits:—The Reliance air-compressor of Messrs. Hathorn, London, was shown both in model in the hall and in actual operation at the docks. The special objects of the improvements of which it has been the object are the economy of power, which in most compressors is very seriously reduced by the time the actual driving is commenced. The air cylinder is placed between two steam cylinders, and as the length of the stroke is the same in each one crank shaft suffices. The connecting rods are of the marine type, with provision for taking up wear. The foundation plate is the air receiver, which is capable of standing a pressure of 200 lbs. to the square inch. The valves have received special attention. The inlet is cylindrical, guided by a central spindle, and works in a hollow cylinder. The valves and their seating are quite flush with the inside of the cylinder cover, and they can be removed without breaking the cylinder cover joint. Friction is reduced to a minimum by the valve being counter balanced by the air. The delivery valves have central guides, and are fitted with spiral springs, which deaden the shock on opening and close it smartly. By reducing in these ways the friction of the valves to a minimum, there is a direct saving of one-third of the power. The arrangement of the cranks is such—the angles of all three being equally divided—that when each of the steam cranks is at the most effective part of its stroke the air piston is exercising its highest effort. The air is drawn in so quickly and compressed so directly that it has no time to absorb heat. Hence further economy of power, the avoidance of the necessity of cooling by direct contact with water, and a cool exhaust to aid ventilation.

The Eclipse rock-drill of Messrs. Hathorn was also in operation at the docks. It has been greatly improved. The feed is strictly automatic, dependent on the amount of penetration made, and the drill is propelled with all power up to the moment of making its stroke, a pneumatic cushion being formed by the valve arrangement at each end of the cylinder to prevent jar and vibration. The valve is moved by direct action by the exhaust steam carried in a recess in the piston, singularly small for the effect it produces. The valve has seven ports, five live and two dead, and it works so easily and effectively that when removed from the machine the breath is quite sufficient to operate it with ease. The feed in its way is equally simple and effective, and cannot operate unless and in proportion to the progress actually made. The trial at the docks was in every respect highly satisfactory. The machine was set to operate upon a block of granite nearly 15 in. thick, which it ran through in 4 minutes. The first 7½ in. was pierced in two minutes, and in three minutes this had been increased to 10 in. The compressor started with a pressure of 80 lbs. The Society's first silver medal was awarded.

At last year's exhibition Messrs. Jordan and Son, London, exhibited their hand-power drilling-machine. Since then it has been greatly improved as to be really a new implement, and has been well taken up in Germany, while it has just been introduced at Melle near, where it is doing excellent work. One great obstacle in the way of extending the use of mechanical boring in the mines of Cornwall and of other metalliferous districts has been the prime cost of air or steam driven apparatus, and another is to be found in the smallness of many levels. Here Jordan's borer steps in. It is really, as the president said, to be regarded in the light of a tool rather than of a machine, and it can be used wherever the miner can work. Two men can drive it with far more ease than they could drive in the ordinary way, and where three are employed—two to turn the handles and one to advance the drill, which has to be done by hand, and they take this latter work in turns, the labour is by no means heavy. The machine as now shown is so efficient that it actually drove 2 in. in the hardest granite in half a minute. About 120 blows are given a minute, with the impetus and force due to a pressure of 80 lbs. per inch on the piston when at the top of the stroke, and a dead blow of about 20 lbs. when at the bottom. This is contrived by an arrangement for surcharging the top of the cylinder with air, which can be carried to such an extent that it would be impossible to turn the handles. A small relief valve, however, keeps the feature of the mechanism thoroughly under control. A first silver medal was awarded.

Messrs. Tangye Brothers, of the Cornwall Works, Birmingham, sent one of their new patent vertical engines. As displaying new arrangement rather than invention it was not considered to come within the conditions of the competition so as to be awarded a prize, but the judges were unanimously of opinion that too much could not be said in its favour as a machine combining the best qualities, and as being compact, strong, durable, and displaying superior workmanship allied to great cheapness. The standard and bed-plate are cast in one piece, and are wholly self-contained. The bearings have large wearing surfaces, and the connecting rods are of the marine engine type. In fact, in every particular strength, efficiency, and economy in use and working have been studied.

Messrs. Plambeck and Darkin, London, exhibited West's patent six-cylinder steam-engine in work at the docks, where it was greatly admired. The one shown was of 12-horse power, working up to 500 revolutions per minute—a miracle of compactness with no exposed working parts beyond the shaft. This engine has now been carefully tested for more than two years, and the wear and tear found to be very slight. Its economy in working according to results ascertained in yacht driving, is marvellous, for it has been worked with a consumption of only 2½ lbs. of coal per indicated horse-power per hour. This, for a non-condensing engine, is almost incredible. It is made also on the compound form. The six cylinders form one casting, and are arranged like the barrels of a revolver, parallel with each other. The pistons take the form of solid rams or plungers, and their lower ends, shaped like blunt cones, bear continuously and in order against the periphery of the driving plate, to which they give a rolling motion. The pistons are single-acting, subject to steam pressure on the flat end only, and three of them are constantly in action at different points of the conical driving disc. This disc is supported at its centre by a ball and socket joint, and also rolls on the conical surface of the back plate, which protects the ball and socket joint from any undue strain. The crank pin is securely fixed in the centre of the conical disc. As the disc rolls the pin describes a circle, and in this way the shaft is rotated. The stroke is of course very short—in the engine shown only 3 inches. The valve arrangement is singularly simple and effective, leakage being practically impossible. The cut off is generally at the half-stroke. This engine received a second silver medal.

The low-water alarm and detector of Mr. Henry House, of Bedford, was likewise in operation at the docks. Nothing can well be simpler. It consists of a vessel fitted with a whistle worked by a ball tap. When the vessel contains the proper quantity of water, and this is directly dependent upon the quantity in the boiler, the ball tap occupies a horizontal position, and the whistle is closed. Directly the water in the boiler sinks below its proper level the water in the vessel runs out, the ball tap falls, the whistle is freed, and the steam rushes through the opened pipe of the detector from the boiler, and gives the alarm. The apparatus can be used either

with or without a whistle, and placed in any desired position; and from the description it will be seen that it cannot get out of order, is entirely self-acting, and cannot be tampered with.

The first *Mining Journal* prize of 3l. 3s. for the best method, mechanical or chemical, of making marketable, with commercial advantage, ores or minerals raised in Cornwall and Devon, and hitherto regarded as worthless, was awarded to the Patent Brick, Tile, and Pottery Company (Messrs. Candy), of Chudleigh-road, Devon. This firm has taken in hand the hitherto unutilised and worthless top clays of the Bovey Heathfield deposit, and has produced thence various descriptions of vitreous and other pottery in fire and sanitary and building bricks, tiles, and garden edging, with articles of ornamental stoneware closely resembling the Doulton in character, and little inferior in quality. These goods they are enabled to render at a very cheap rate by the adoption of special machinery and appliances, and so strong are the sanitary bricks that they have withstood a crushing weight of 320 tons to the square foot. The excellency of the ornamental ware was marked by a further award of a first bronze medal, and the kiln employed also had a second silver. This is a continuous kiln, on the patent of Mr. Thos. Carder, and in it the burning and the fixing the colour and the enamel are all done at once and the same time. The consumption of fuel is very small, 3½ to 4½ cwt. of "through and through" per thousand. The lignite of the Bovey field is likewise utilised. The arrangement of the kiln is not fully explainable without the aid of a diagram, but it differs in several important particulars from Hoffman's. The green bricks direct from the machines are dried in the drying chambers or tunnels by the utilization of the waste heat from the main flue without the additional cost of fuel labour and separate buildings.

Letcher Brothers, St. Day and Camborne, exhibited three sets of blowpipe apparatus. They showed that which gained the first prize of the Society of Arts, the silver medal, and that offered by Colonel Croll for the best blowpipe set to be sold at a guinea, and two other sets, with additional appliances. All are called Society of Arts boxes, however, the society, in consequence of the value of each arrangement, having sanctioned the use of their name and seal on the label as a protective privilege in the manufacture of the better class of boxes also. The packing is a marvel of ingenuity and safety; and now that the higher priced sets have been made the wants of all classes of blowpipe students, so far as qualitative analysis is concerned, are fully met, in the cheapest and most satisfactory manner. A first bronze medal was awarded. Dr. Foster said of it in the *Mineralogical Society's Journal*:—"The prize of 10,10s. and the silver medal of the Society of Arts for the best guinea blowpipe apparatus have been awarded to Messrs. Letcher Brothers, of St. Day and Camborne. Their box, which is only 10½ in. long and 4½ in. wide, by 3½ in. deep, contains no less than 42 different articles, and these are all packed in a highly ingenious manner. Each article fits into its own little recess, and consequently neither paper nor wadding are required. The apparatus contains the necessary appliances for testing most minerals and ores, and the Messrs. Letcher's box will be found most useful to mineralogists as well as to miners, chemists, and metallurgists. It undoubtedly far excels any set that has been sold here or abroad for the money; and the Society of Arts deserve the cordial thanks of students and practical men for having enabled them to get such compact, portable, well fitted, and well arranged blowpipe apparatus for so little money. We quite believe that if the Messrs. Letcher were to apply their ingenuity to the sets for quantitative work they would soon produce an apparatus far better packed, and in much smaller compass, than those supplied by Herr Lingke, the well-known Freiburg maker."

The patent shaft coupling of Messrs. King and Co., London, for the repair of broken shafts of screw steamers, is so important and efficient an arrangement that we should not be surprised if the Board of Trade did not make its provision compulsory on the owners of such vessels. It may be described as a kind of mechanical "splint" in four sections, which are set to embrace the fractured portion of the shaft, and then firmly bolted and keyed together. When this is done the shaft is, for all practical purposes, as strong as it was before—in many cases even stronger. There is no difficulty in the attachment. All that is needed is to shave a portion of the curve of the shaft, and the coupling, which is, of course, adapted to the sizes of the various shafts, can then be fixed. It has been thoroughly tested in rough weather, and always found to be available, whereas it is seldom possible to fix efficiently spare lengths of shafting, even if curved, exactly where most needed. Thus an efficient remedy for the most frequent cause of accident to screw vessels is provided. The judges awarded a first bronze medal.

Mr. Thomas Roberts, of the Mounts Bay Foundry, Newlyn, had a first bronze medal for his patent antifriction suspension capstans. They are worked by winches driving bevelled gearing in three degrees of power, instead of by levers, and consequently are available in unusually small rooms. The mechanical arrangement, too, is such that the power exerted on the handles is applied in its fullest extent on the load to be lifted. These capstans are specially adapted to the use of fishing vessels. The cover is fixed by a screw nut, and is, therefore, easily removable.

Mr. T. Warsop, Nottingham, sent a new form of attachment for pick heads. The handle is fitted with an iron cap and screw. The pick is dropped over the cap, and the screw fastens it in its place beyond the chance of shifting, while it can be removed for sharpening or replacing by another head with the greatest ease. The ingenuity of the arrangement was recognised, but it was hardly thought it would be adopted in the country.

Mr. A. Pumphrey, Birmingham, had a second bronze medal for a very ingenious and simple arrangement of autographic printing—an adaptation of lithography for office and private use called "colligraphy." It does not destroy originals, and the results are at once instantaneous and permanent.

A series of wooden tamping plugs, pierced for the passage of the safety-fuse, and made in different lengths for different sized holes, were shown by R. Pentecost, Camborne. They were of soft wood—alder, sycamore, and poplar, and were intended to be driven in upon the charge. The inventor's belief is that explosions in tamping holes or withdrawing charges almost invariably take place within an inch and a half from the top of the charge, and that in too many cases the hole is strongly impregnated with powder from this distance to the top of the charge. The advantages claimed are that when the fuse is accidentally injured the hole can be picked out with safety instead of a new one being bored, and that a new hole can be bored in the plug with an auger for a new fuse, in addition to the increased element of safety. A money award was made, and the plugs recommended for trial.

Only one form of stamping apparatus was shown, and that did not commend itself to the judges. It was an arrangement by Mr. Joseph Richards, of Hayle. The lifters and stamp heads are fixed at the end of long flat springs, which pivot on an axle, and which are alternately raised by levers driven by eccentric on a shaft placed above the centre of the springs. It was not very apparent what was supposed to be gained by this device.

The entries of engine models and of drawings were not numerous, and did not call for particular notice, with the exception of a beautiful series of drawings by Mr. Bisson, of Falmouth, which the judge warmly praised, but which did not come within competitive conditions.

Messrs. Dingey, of Truro, sent a model of their patent winding apparatus, which has now been fully tested in actual work, and which gives the filler at the bottom of a shaft or incline absolute control over the hauling, while the motion continues in the same direction. This is effected by the use of their radial clutch gearing. A series of arms are fitted on the axle, and have movement to and from the drum. As they are brought closer to the drum they, of course, expand, and their ends then pressing against its inner circumference set it in motion, and the winding proceeds. They are brought into operation by the action of a weight, controlled by a brake at the will of the filler, and can thus be put into or thrown out of gear instantaneously.

Mr. Stephen Sara, Penryn, exhibited a new form of perforating machine for the use of printers, bookbinders, saddle and harness makers, and soft sheet metal workers. It does not punch but simply perforates, and its action is easy and effective; and while, of course, it would not supersede the present perforating apparatus, its sim-

plicity and efficiency opens for it a wide field of usefulness. The teeth can be replaced as desired, and all springs are dispensed with, the perforating rack being raised and lowered by means of three eccentric cams. A first bronze medal was awarded.

A second bronze medal was given to Dr. Ancel Bell, of Spalding, for an ingenious arrangement, by which one fire is made to do double duty, and fall into two rooms without infringement on privacy, and with the most economical results in construction and use.

Mr. J. Beale, of Truro, exhibited patent india-rubber break blocks for railway and other carriages, which are noiseless and efficient, and have already proved remarkably durable. They had a second bronze medal.

Mr. F. Player, of Neath, forwarded his porous non-conducting cement for covering steam-boilers and pipes. The chief characteristics of this composition are its porosity, which by the exclusion of a large quantity of air in its interstices renders it an exceptionally good non-conductor; its adhesiveness, its hard and smooth surface, which renders it capable of efficient protection by tar and paint, and its property of indicating a leak by becoming soft over the faulty joint.

Mr. W. Morshead, London, sent a drawing of a new form of governor for pumping-engines, intended to guard against the consequences of an engine being suddenly relieved of the whole or a part of its load by the breakage of the pump-rod or other connections. The value of an automatic governor which would reverse the valves and arrest the motion in case of the engine attaining an unusual speed suggested itself to the inventor many years since. This he now proposes to effect by giving a uniform motion to the plunger of the governor by a slide attached to the plug-rod, so shaped as to compensate the varying velocity of the engine, which throughout the indoor stroke increases in velocity up to a certain point, and then gradually decreases towards the end.

The St. Day Fire-Brick Company, in addition to a capital sample of fire-bricks, were represented by some large quoins intended to supersede granite dressings.

Amongst the general awards in the mechanical section not already mentioned were—T. H. Caldwell, 1<sup>st</sup>, for workmanship of model engine; S. Terrill, Redruth, 1<sup>st</sup>, for improved door-lock; Blakey Brothers and Co., model foot-lathe, highly commended; C. Bellamy, patent safety carriage appliances for releasing runaway horses, commended; F. Ayckbourn, improved horse nosebag, 2<sup>nd</sup> bronze medal; Warsop's patent interchangeable pick, commended.

In the statistical section, 1<sup>st</sup> silver medal was awarded to Mr. Howard Fox, for a paper "On the Pilchard and Pilchard Fishery," containing a quantity of valuable statistics. Col. Tremayne's special premium for the best description of the mineral veins and phenomena of a mineral district was given to Messrs Argall and Kinahan, for a paper fully illustrated, descriptive of the mining district of Avoca and Wicklow.

Mr. RICHARD TAYLOR, F.G.S. (the President), in his inaugural address, dealt with several important practical questions. Speaking of the wares of the Patent Pottery Company, at Chudleigh-road, to whom for their excellent utilisation of otherwise waste material the *Mining Journal* premium had been awarded, he (Mr. Taylor) said: The value of the clays of Cornwall had been known for ages, and the working of a particular description of clay had been the source of very great wealth to the county. But it had been pointed out over and over again, and very strikingly by an exhibitor two or three years ago (Mr. Borlase), that there were a number of clays of excellent quality in the county entirely neglected. Now, although the articles he had referred to were not made in Cornwall, they were made in the sister county of Devonshire, and he had every reason to believe that the clays of which they were made, and which were described as waste clays, were clays which had to be mined to get at the true potter's clay, which had long been a source of profit to that part of the country. In fact, the clay of which the beautiful pottery exhibited was made had been hitherto considered useless refuse. He had no doubt that they would be able to show in Cornwall clays of the quality of that refuse. It was one of the projects he had cherished for many years—that they should see somewhere established in that neighbourhood a good pottery. They had already established, between Falmouth and Redruth, two or three works at which clay was converted into an excellent description of brick, the same clays which made these bricks, when properly mixed and tempered, he was led to hope might be made quite fit for pottery. He thought that if they could establish a new industry or that kind at Gwenapp, or Feock, or other places that had suffered so much by the decline of mining, it would be of the greatest possible benefit to the county. Rock-boring machinery in the next place came under review, and in introducing that subject Mr. Taylor spoke highly of the Eclipse drill of Messrs. Hathorn, which was working admirably at the docks. There were many other excellent rock-drills which did a great work. For instance, the McKean drills employed in tunnelling through the Alps were doing an immense work, and the Barrow rock-drill that had been employed at Dolcoath did excellent duty. At West Tolgus they had just adapted that particular drill for sinking a shaft, and he was happy to say that it promised to be a complete success. They had in the mines in which he and his family were concerned as managers five or six different drills working, and of all of them he thought they might say a word of praise, though there were, of course, some better than others. The machine that had done such extraordinary work in Carn Brea—the percussion drill of the Diamond Rock-Boring Company—was extremely valuable under various circumstances. The most important advantage would be felt where great rapidity of advance was required, either in driving levels or sinking shafts. At the Halkyn Mines, in Flintshire, a deep level was originally driven at great cost by an ancestor of the present Duke of Westminster, and before his (the speaker's) father came into possession of the Halkyn Mines. The enormous quantity of water in these mines, combined with the low depressing prices for mineral, led to their abandonment some years ago, and several other mines in the same district had shared the same fate. The Mold Mines, extending a distance of 12 miles from the mouth of the great adit level he had referred to, were also abandoned in consequence of the accumulation of an enormous quantity of water, and the low price of lead. He had a list of some 20 mines in the district adjoining Halkyn Mines that were worked as deeply as the water would permit. The year before last it was proposed to the Duke of Westminster to assist a company, with his brother and their firm, to undertake the enormous task of extending this great adit, or tunnel, to unwater all these mines. The length would be, in a direct line, something like a dozen miles, and there were a number of branches. The tunnel would go under the deepest part of the mines, and consequently the drainage of the whole district would be secured. He had originally regarded this project as one of which his children might see the end, but which he would himself live to see. A contract for two years had, however, been entered into with Major Beaumont, and the progress made was somewhat marvellous. The tunnel was 8 ft. square, and in six months had been driven 150 fms., while during the last month the actual advance in hard rock—for the limestone in Flintshire was harder than the greater part of killas in which they worked in this county—was 63 yards. Going on at that rate he hoped to live to see, at any rate, half a dozen mines unwatered. It was desirable that they should do all they could to encourage the perfection of these instruments, because of the rapidity with which they were worked, and he had no doubt the work could be done much more cheaply than it could be done by hand labour. The hand rock borer, on the whole, he considered more properly a miner's tool which might be applied in an ordinary mine, and without the necessity of a large outlay. It was originally an American invention, but was made practically useful by Mr. Jordan, their former secretary. Though they rewarded it last year with a premium it had several defects, but he was happy to say these had been very well remedied, as he could speak from experience, having had it set in Mellanear Mine to drive the bottom level of hard ground. It appeared to be doing very good work indeed.

Mr. A. P. VIVIAN, M.P., in proposing a vote of thanks to the President, said the suggestion he had made as to the use of inferior clay was one of remarkable value to the county of Cornwall, especially if it could be adopted, so as to make up in some degree for the inevitable falling off in mining. With regard to the rock-boring

machine, he thought great credit was due to Mr. Basset for the premium he offered some years ago for a boring machine, and it was, therefore, he who brought forward rock-boring machinery to show that it could be used with advantage in Cornish mining. If they were to compete with foreign countries in mining, he could only say that they must apply themselves to getting the finest and best description of machinery. People in this country could form no opinion of the mineral deposits in some foreign parts. He had recently been in the Western States of America, and he was astounded at the mineral deposits throughout those States. We could only compete with them by the greatest attention to economy and the best machinery.

#### THE MINERS' ASSOCIATION OF CORNWALL AND DEVON.

The annual meeting of the Miners' Association of Cornwall and Devon was held in the Polytechnic Hall, on Wednesday, Mr. RD. TAYLOR, the newly-elected president, in the chair. There was a large attendance, and a very influential one, including the Rev. Canon Saltren Rogers; Messrs. W. West, M. Loam, W. M. Grylls, Capt. J. Thomas, Capt. A. Williams, J. H. Collins, F.G.S. (secretary), B. Kitto, F.G.S. (lecturer), A. K. Barnett, F.G.S., Dr. Oxland, F.G.S., Dr. Foster, F.G.S., F. Michell, Cunnack, S. T. Cox, Capt. Bishop, C. Oxland, J. Henderson, J. Hocking, C. Twite, P. H. Argall, A. T. Davies, Trowan, and Jordan.

The Rev. SALTREN ROGERS, in opening the proceedings, referred to the lamented death of Mr. C. Fox, one of their ex-presidents. He hoped that attention would be directed to a subject which Mr. Fox considered of great importance—the use of the turbine. He hoped also that Mr. Collins's idea as to the use of wind to pump up water into reservoirs to great power would also be worked out into practice. The results of the blowpipe examinations appeared to show that more attention should be paid to this, and he recommended to notice Messrs. Letcher's excellent blowpipe apparatus. They were glad to welcome the Mining Institute in the field. Both societies were working to the same end, though one brought together rather the older members of the mining community, and their own trained the younger.

The Council in their report stated that during the past year Mr. Charles Fox, one of the oldest supporters of the society, who had helped Mr. Hunt to find it, had been lost by death. Miners would never forget, too, that it was through his liberal offer of a premium that the man-engine was first constructed. The members attending the classes for technical instruction had continued to increase during the past year; more successes had been attained at the May examinations than in any previous year. The Miners' Association medal had been gained by no fewer than three of the members—A. T. Davies, of St. Agnes, who had passed second-class in the honorary examination in the principles of mining, first-class advanced stage of mineralogy, first-class advanced stage of inorganic chemistry, and had had the requisite amount of practice underground; W. Rich, jun., of Redruth, who had passed first-class in the advanced stage in the principles of mining, first advanced in inorganic chemistry and in mineralogy; Cornelius Beringer, of the Redruth class, had reached the requisite standard in the examinations, having taken first-class advanced in the principle of mining, the same position in mineralogy and practical chemistry, but the presentation of the medal had been deferred for a few weeks until he should have completed his requisite time underground. The *Mining Journal* prizes had been awarded—Chemistry: E. C. Corin, Penzance, first-class in the advanced stage, and the same position in practical chemistry.—Mineralogy: H. F. Collins, Truro, who passed first-class advanced stage.—Geology: Joseph Bedgood, Pool, second-class advanced stage.—Principles of Mining: A. T. Davies, St. Agnes, second in the honour examinations. The success of the system of district classes, introduced in the year 1868, had been at once a source of gratification and of anxiety to your council—of gratification on account of the large amount of work done, and anxiety because of the large and increasing expense. Uneasing efforts have been made to increase our income, and these have been to some extent successful, but yet the debt has gradually become larger. The sub-committee appointed to consider the whole subject, consisting of Dr. Foster, Mr. J. H. Collins, and Mr. B. Kitto, have presented a report, which the council accept, and now offer for the approval of the members. The scheme is as follows:—"In future all the district classes should be to a larger extent self-supporting. Any class in Cornwall or Devon in which any of the subjects recognised by the Miners' Association are taught may be affiliated to the Association by an annual payment of not less than 5s. The merits recognised by the Association are there numbered 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 18, 19, and 22 in the Science Directory, third edition, 1877. The advantages offered by the society to affiliate classes are as follows:—1. Pupils of the affiliated classes will be entitled to, first, the Miners' Association medal; second, the *Mining Journal* prizes; third, the council prizes, consisting of books or mathematical instruments to the value of 10s., one on each subject, to be awarded under the same regulations as the *Mining Journal* prizes, but not to such pupils as obtain the latter. —2. Supervision and occasional lectures from the lecturer to the Association.—3. Every pupil of an affiliated class will be entitled to a copy of the Miners' Association report.—4. Pupils of an affiliated class will be allowed a discount of 20 per cent. in purchasing scientific works or manuals through the Association.—5. To join in the annual excursion.—6. To borrow books from the library.—7. To make use of the laboratory at Camborne, under regulations to be ascertained from the committee." The council believed this scheme would further extend the usefulness of the Association, and enable the lecturer to open up new classes in new districts. They recommended the election of Mr. R. Taylor, as president in succession to Canon Rogers, and Capt. Teague, jun., and Mr. C. Twite on the council and executive.

Mr. B. Kitto, the lecturer, reported:—"A reference to the list of successful students at the late examinations will show that a great deal of work has been done in the past year. The list will be observed to have a new column under the head of practical chemistry. The reason of this is that in former years the candidate's knowledge of chemical analysis was tested by certain questions not in the general examination; but in the last May examination, in addition to answers being required to these the pupils who took up the advanced state of this subject were required to perform a quantitative analysis of certain substances in the solid state, which were sent down from South Kensington sealed up in bottles. This analysis took place on a separate night, and four hours were allowed for the work. Amongst the substances sent were sulphate of iron, chloride of tin, chlorate of ammonia, carbonate of cadmium, &c. Each candidate had one substance, and was required to find both the base and the acid. This examination could only be held where there were laboratories well supplied with the necessary reagents and apparatus. Camborne, Penzance, Helston, and St. Agnes are recognised by the Science and Art Department as fulfilling the conditions. The room at St. Agnes, however, was passed for one year only, and another and better room will have to be provided if that place is to be considered in future as having a laboratory. Five members of the Redruth class attended about 30 evenings at the laboratory at Camborne, and every one of these passed first-class in the examination. Indeed, the results in all the classes are excellent; nearly everyone who took the examination having been placed in the first-class. With regard to mineralogy there has been for some years dissatisfaction among the teachers at the nature and wording of the questions set by the examiner on that subject. It is thought that they might be made more practical, and to be put into such form as to be better understood by the candidates. The institution of the Miners' Association medal has been a great stimulus to the study of the principle of mining. I have always noticed considerable reluctance to enter for examination on this subject. The range of questions is so wide that it is regarded as a very difficult examination to take up, notwithstanding the practical acquaintance many of those attending our classes have with metal mining. Two of the district teachers have taken second-class honours as the result of the last examination, and some others passed very creditably. Altogether it is the best list we have had for mining. The total number who satisfied the examiner was 16; last year it was only three. The two classes for machine construction and draw-

ing have been well attended, as will be seen by the list of successes. There were also more than the usual number who succeeded in mathematics. The Society of Arts, again, held their examination on quantitative analysis by the blowpipe at Redruth in June. Of the ten candidates who entered three succeeded in getting the certificate of the Society, and one of them (C. Beringer, of Redruth) did so well as to be awarded a prize of £1., the highest offered by the Society. During the year many assays of copper, iron, and manganese have been made at the Camborne laboratory by nine members of the classes, and we hope shortly to extend the practice to lead, silver, and gold. The books most in request from the library have been Callon's "Lectures on Mining," Smyth's "Coal, and Coal Mining," and Phillips's "Metallurgy."

Dr. OXLAND proposed the adoption of the report, and expressed the pleasure he felt at seeing the attention paid to chemistry.

Capt. N. WILLIAMS, in seconding the motion, which also included a vote of thanks to Canon Rogers, expressed his conviction that the labours of the Association had conducted greatly to the improvement of mining.—The motion having been carried,

Mr. TAYLOR took the chair, and directed attention to some of the subjects which should most engage the attention of miners—the helps that were to be looked forward to extricate the mining community from the present condition of difficulty. They had to try to relieve themselves by cheapening the production of their mineral wealth. In no district of the world was there such a variety of mineral wealth, and in similar abundance. Many subjects crowded upon our thoughts on such an occasion, but he thought it would be agreed that economy in working a mine was the great subject to be sought after. The need of draining mines led to the introduction of the steam-engine, which made a very great and sudden change in the means of working the Cornish mines. He had lighted upon an old pocket-book of his father's which contained the experience of mine managers as to the introduction of steam, and there was an entry that Watt had considered a duty of 20,000,000 at Herland the most that could be hoped for. The progress of duty had gone on since then in Cornwall more rapidly than in any other district, thanks to the engineers of Cornwall, one of those who engaged in that work being with them that day—Mr. West. Next to Mr. West he saw the sons of two other engineers of that day—Mr. Loam and Mr. Hocking—whose fathers were associated with Woolf, with whom he (the President) had often cut his pasty. Duty had been advanced until 100,000,000 was considered quite reasonable. Since then duty had fallen off, and to an extent that was hardly creditable. He hoped, however, that by the attention of managers and engineers Cornwall would again regain its position. Great economy they might be sure would result. A means had recently been introduced of testing the duty of a boiler as distinct from that of the steam-engine. A Cornish engineer in the service of the Cape Company had shown that very nearly 11 lbs. of water had been evaporated by 1 lb. of coal in a common Cornish boiler fitted with Galloway tubes. This was effected by careful stoking, and Mr. Hocking was about to carry out experiments in that direction at Mellanear. There were other points connected with the steam-engine itself which needed to be attended to. The next object which struck him as most important was one in which he was happy to think that great progress had been made. They had reason to anticipate that great economy in working mines would result from the use of the boring machinery. There were two ways in which boring machinery would help them—one in which it was considered desirable to push on, regardless, as they might say, of expense.

Mr. Taylor then referred to the operations of the Halkyn District Mines Drainage Company, incorporated by Act of Parliament, and with the Duke of Westminster at the head of the board of directors, the object of which was to drain by means of adit levels the rich and extensive mineral district in the parishes of Halkyn, Cileen, Northrop, and Mold, in Flintshire, comprising an area of 714 acres. There are some 30 old and well known mines in this district, all of which, with scarcely an exception, have succumbed to the pressure of heavy water charges. To effect the end in view the company commenced with the Halkyn deep level as a basis of operations. This level was commenced in 1818 by the then Earl Grosvenor, and driven about 1½ miles. The project now in hand is to carry a main adit tunnel some 11 or 12 miles, besides branches. For ordinary mining they needed machines of as economical a kind as possible; and here Mr. Taylor referred to Jordan's rock-drill in much the same effect as on the previous day; in conclusion, pointing out the importance of improving ore dressing as far as possible.

#### JORDAN'S HAND POWER ROCK-DRILL.

Mr. JORDAN, jun., read a paper on the hand-power rock-drill of his firm, as exhibited in the Polytechnic Hall, and in its other adaptations. The machine, he said, was composed of a cylinder fitted with a piston and a tubular rod, which passed through both covers. Three nap leathers were used in packing this arrangement—one in the lower gland, one under the cover, and one in the piston. They were all simple washers of leather of rather greater diameter in width than the joints they were intended to close. That on the piston had its edges turned upwards against the cylinder; that in the lower gland was also turned upwards against the lower rod or trunk, which was about 3-16ths of an inch less in diameter than the piston. That under the top cover rested on a gun metal ring, and both its edges were turned downwards; on the top of the tubular piston rod was the lifting block, by which the cams when rotated lifted the piston in the cylinder twice in every revolution of the cam shaft. The result was that the air in the upper part of the cylinder was strongly compressed and instantly released about 120 times in every minute, giving that number of blows on the rock with the impetus and force due to a pressure of 80 lbs. per inch in the piston when at the top of the stroke, and a dead blow of about 20 lbs. per inch when at the bottom. The mode of obtaining the dead blow required a few words of explanation. It had been stated that the trunk or lower half of the piston rod was 3-16ths of an inch less than the piston, and, therefore, when this trunk was in the cylinder there was an annular space round it filled with air, which entered freely past the lower leather during the top stroke, but could not return during the down stroke, because the lips of the leather closed against the trunk and acted as a valve, but on the lip of the piston leather was also turned upwards it readily passed to the upper portion of the cylinder, and surcharged that space by an addition of several cubic inches at every stroke.

If this went on without any means of escape the pressure would of course become so intense that it would be impossible for the two men employed to continue turning the handles. This contingency, however, was provided against in a small relief valve in the upper part of the cylinder, which was regulated by a screw adjustment so that the force accumulated in the cylinder could be exactly balanced against the power of the men on the first motor. Hence they made the dead blow alluded to, which avoided recoil and merely doubled their rate of boring. Feeding and turning were done simultaneously with the lift by the action of the cam or the under side of the lifting-block. The drill rod passed through the tubular piston-rod. The lower half was decagonal, and fitted in a steel bush in the bottom of the trunk, so that one could not turn without the other. The upper half of the rod was cut into a screw of 8 or 10 threads to the inch, and fitted with a long nut of phosphor-bronze. The lower part of the nut was formed into a thrust bearing, and enclosed between the two valves of the lifting block, the upper part was placed decagonal to fit the neck of a bevel wheel, through which it slid, but could not revolve without the wheel. When this wheel was stopped, and the lifting block turned by the action of the cam, the screwed rod was turned in the nut and forced the tool forward. If the nut was turned with the rod there would be no feed, therefore by regulating the angle through which the tool was turned at each stroke, they regulated the feed. This was done by projecting cogs on the top ring of the lifting block, which could only escape one cog for every blow. Thus the angle through which the tool turned, and also the automatic rate of feed, was determined by the number of cogs on the top ring and the pitch of the screw. There was a hand wheel, by which the tool was readily withdrawn, which might also be used to hasten or retard the feed.

while working. As an alternative to hand-power, and in preference to compressed air, Mr. Jordan suggested the use of hydraulic power as a motor. All deep mines had a source of power at command in the pump column, and this he suggested as the most convenient and cheapest means of transmitting power to the end of any level. The idea was not novel, but had failed to obtain the attention it deserved. The cost of any power required for driving small hydraulic engines for such a purpose as shown by that of pumping the quantity of water used through the head employed, a duty of 60 per cent. might fairly be reckoned on.

Captain Bishop followed with some remarks upon recent boring experiments at East Pool, where they had no machine, but had introduced a very advantageous principle of driving by hand labour. They are driving in the 195 fathom level by hand-labour, at 21*f.* per fathom. Six men and three boys drove about 2 fms. per month, and the men earned about 3*s.* 5*d.* They then offered the men 4*s.* per fathom, irrespective of cost, on the condition of deducting 2*s.* 6*d.* per foot for every foot made, and paying 5*s.* per foot for every foot more. The men put in long holes, and drove 20 ft. in the first month. 20 ft. in the second, and 21 ft. in the third. Then they had 4*s.* 10*d.* the first two months and 4*s.* 15*d.* the third. The men worked very hard on the inducement of getting more money, and it was found they could double the drivage under the old system without its costing the mine 1*s.* more. This showed what could be done by manual labour. They had had an experiment, boring four 6-ft. holes in a converging form, and charged them with 13 lbs. of Mr. Cunnack's explosive. The end was brought out 5 ft. 10 in., and the end was 3*s.* 3*d.* by 2 ft. 7*i.*

The PRESIDENT pointed out that these results showed the advantage of adopting the mode of putting in holes adapted to the machines. They must go forward with a uniform system, instead of putting in holes in the old-fashioned way, to the most advantage. In attempting to carry out the old system with the machine, great loss of time was incurred in moving the machines. On the whole, there was great advantage in using electricity for exploding, and the effect of successive blasting was not so great. He hoped that at East Pool Jordan's, or similar machine, would be used if it could be shown that by it three men could do more work, for beating the borer was most injurious to health. He did not desire to praise one machine above another, though people might draw conclusions from the machines his firm employed. They had done excellent work at Minera with the Darlington, in the Isle of Man with the Barrow. At West Tolgs they had the Barrow, which was doing very satisfactorily. Altogether, they had six or seven different kinds of machines, but they had, more or less, all of them one fault—that of being too light. The hand-power machine was within reach of all, costing about 6*s.*, against 13*s.* 0*d.* or 14*s.* 0*d.* they had had to expend in plant at West Tolgs. The men at Mellanear liked the Jordan drill very much, and at West Tolgs the men had had their labour so much lightened that they had asked to work eight hour cores instead of six.

Capt. HENDERSON, on behalf of Messrs. Hathorn and Co., wished to correct what he thought was an error on the part of the President on the previous day. The Eclipse drill had not been shown before.

The PRESIDENT rejoined that Messrs. Hathorn last year showed a compressor with which they had an Ingersoll drill. He had not said that the Eclipse drill was exhibited at the previous exhibition. He had only said that it had worked very well this year.

The next paper was taken as read.

#### THE MINES AND MINERAL LOCALITIES EAST OF THE OVOCAS RIVERS.

This was the paper prepared by Mr. P. H. Argall, of the Cronebane Mines, and Mr. G. H. Kinahan, M.R.I.A., to which the judges of the Polytechnic Society awarded Col. Tremayne's special premium as containing the best account of a mineral district. The rocks in the district were principally Cambro-Silurian. This system was divided into two groups—below, the dark shale series, and above, the Ballymoney series. In the rocks of the Ballymoney series were found two of the most ancient mining districts in Ireland—that of Bunnahon, in Waterford, and the Ovoca mines under review. The Bunnahon mines differed from the Ovoca in being on contra lodes, and principally of chalcopyrite, while in the latter pyrites predominated. The Ovoca mines lay in a detached basin (all the rocks of which are more or less metamorphosed) which extended from the coast of Wicklow, between Wicklow and Arklow, in a south-west direction to the hill called Croghan Kinsella, a distance of about 15 miles. Under present circumstances the separation of all the eruptive felstones of this series from those due to extreme metamorphic action was an impossible task. At Ovoca, as in the vicinity of the Farys Mine, in Anglesea, the felspathic rocks in the vicinity of the large mineral deposits were impregnated with the sulphides of iron, the surface of the ground having a burnt aspect. Hornstones and allied rocks are found in tracts usually very defined, the hornstones in their strike abutting against unaltered rocks, although the latter might be pure argillaceous shale. The authors, therefore, believed that only isolated portions of the rocks were invaded by the metamorphic action. In a few places lead (galenite) occurred, but in general the ores were of sulphur (pyrites and marcasite) or of copper (chalcopyrite). In some places, however, the gossans on the backs of some of the sulphur lodes consisted principally of the sulphides of lead and other minerals, while native silver, and even gold, had been found.

The lodes were of two classes, those in which the minerals were associated with gangue or ironstone, and fissile veins. The profitable lodes of the first-class carried lead or copper ores. The lead lodes had usually quartz or calc-spar as a gangue, but they were small and few, none being known in the county east of the Ovoca river. The copper lodes of this class were described by Weaver as veins of quartz bearing rich copper pyrites, accompanied sometimes even by earthy azure copper, and not unfrequently by chlorite. The yellow copper ores yielded 10 to 12 per cent. of metal. The range and dip of these lodes more or less coincide with those of the country rock, but they ramify in their extremities throughout the rock, or sometimes coalescing again from a considerable body, even 12 ft. wide of vein and 4 ft. wide of solid copper ore, but they seldom continue productive for more than 30 ft. in length. There are also true contra lodes of this class. The fissile lodes do not make like ordinary mineral veins, consisting of a number of laminae alternations of minerals and killas. They were usually sulphur lodes, but occasionally became coppery, or there might be a rib of copper ore between the sulphur ore and the hanging-wall. In East Cronebane and Conorree Mine there was a gossan ore made up of silver-lead, black and grey copper ores, and the sulphides of other minerals; but in all the mines the gossan was iron ore, ochre, or a ferruginous breccia. The large veins were of an irregular wedge shape, the hanging-walls being more perpendicular than the foot-walls. In some places the lode swelled considerably.

The laminae of ore were always parallel to the footwalls. Quartz seemed to be an accessory. The yellow copper ores gave a low percentage—10 to 12 per cent. in the first-class lodes, and 4 to 6 in the second—on account of the many impurities (pyrites, quartz, and killas) with which it was combined. The sulphur ores gave on an average 32 to 34 per cent. of sulphur, and the better quality, and 1 to 3 per cent. of copper; in depth they invariably become coppery. The lodes of both classes showed an inclination to run with the country. In depth, however, the lodes always cut across the beds, and nearly invariably in length also. The country was much broken up and displaced by faults, and two systems, locally called "heads," seemed to influence it, while the majority did not. One system was evidently newer than the channel, as its faults cut across and displaced it. Those of the second system, though they displaced the lodes, did not cut them off, the minerals being splashed against them, forming a continuous vein from one portion of the lode into the other. The relations between the copper lodes of the first-class, and the sulphur lodes of the second, were obscure. In no case did the copper lode cut across the sulphur. The copper lodes were often merely standing veins, while the sulphur lodes underlay southward at 60°; consequently in depth the copper lodes died out or joined the sulphur lodes, forming a rib along the hanging-wall. The copper lodes were evidently due to the deposition of minerals in solution in shrinkage fissures. This, however, would not explain the sulphur lodes, which bore evidence of gradual and successive opening. The copper lodes might not have begun to accumulate until the greater

portion of the sulphur ore in the main lode was deposited. While the principal mines of Wicklow occurred in the Vale of Ovoca there were ancient mines in the county to the eastward, east and northeast of the village of Redcross, while there were mineral indications in other places. The author then proceeded to describe the various sets including Ballard and Ballycapple, Conorree, East Cronebane, West Cronebane, and Tigrony, with notes on the mines and minerals north of the mineral channel.

This concluded the business.

#### Meetings of Public Companies.

##### BIRDSEYE CREEK GOLD MINING COMPANY.

The annual general meeting of shareholders was held at the offices of the company, Austinfriars, on Thursday,

Mr. J. T. P. PECHIEY in the chair.

Mr. W. J. LAVINGTON (the secretary) read the notice calling the meeting. The directors' report was read, as follows:

The directors have now to present to the proprietors the seventh annual report of the company's operations. The accounts, duly audited, will be found annexed to the report, by which it will be seen that during the past year 291,72 ozs. of gold have been obtained, realising 8706*s.* 7*d.* Including all receipts, the net profit for the year on working account is 52*s.* 19*d.* During the period comprised in the accounts all washing was suspended for about six months, consequent upon the very dry season of 1876-7. It is with much satisfaction that the directors are able to state that the heavy rainfall of the season of 1877 8 bids fair to prolong the operations at the mines this year to a later date than usual. A profit of \$5500 has already been advised since the close of the financial year, and the directors believe this will be supplemented to a considerable extent by the returns yet to be received.

Washing has been steadily carried on in the Neece and West Claim since the commencement of the current water season. The results obtained have been fully up to the usual average, varying from month to month, as work is shifted from the centre to the sides of the channel.

The Waloupa Claim has taken longer to open than was anticipated in consequence of the great depth of the channel, rendering needful an extension of the tunnel; it is, perhaps, unnecessary to state that the very cause of this delay greatly improves the prospect of opening up a very profitable claim. The little washing which has been done, incidental to the opening, has given highly satisfactory results. The claim is now about ready for steady washing, and the superintendent is very sanguine as to results.

Work has been pushed ahead at the Red Dog Claims through the side dirt, while the returns are increasing, and yielding a small profit every month. The expectations as to the value of this claim, when once opened up, have so often been stated that it is needless to recapitulate them. The superintendent's annual report has not yet been received, but is expected to arrive in time to be submitted at the general meeting.

The directors would again take this opportunity of expressing their entire confidence in the ability and energy of their superintendent, of the economy with which he has conducted the company's operations, and of the very great assistance he has rendered them in tiding the company over a period of much trouble and anxiety. The directors believe that the turning point in the operations of the company has now been reached, and that with an average water supply the accounts will for the future show results far more satisfactory than those which have characterised them for some years past.

The CHAIRMAN, in moving the adoption of the report and accounts, said that when they met this time last year they would remember that on the other side they were suffering from one of the driest seasons which had ever been known in the history of California. After the accounts were made up to June 30 last year the washing was stopped in July, and the total profits which were made for the balance of the year amounted only to about \$4000. At that time they were getting profitable results from the Neece and West claims only. The Red Dog claim was in process of being opened up, although little work was done. The Waloupa claim was only opened to an extent which showed the necessity of running a further tunnel. Therefore, they were left on July 21 with no further work before them, and the only work which could be done was to run the Waloupa tunnel, and some other smaller work. During all this time of enforced idleness the expense went on, and when they commenced this year they found themselves with a heavier load of debt than a year ago. The position they were in now was this: the Neece and West claims, which they had depended upon in the last two years, was producing the usual amount of gold, and making the usual amount of profit, and there was every reason to suppose that that it would continue. The Waloupa claim had taken longer to open than was anticipated, but it was satisfactory to notice that the reason for the delay was found in there being a very deep channel, but from all the directors could learn there was every reason to expect that they would have there something better than anything they had hitherto had in the history of Birdseye Creek when that was opened up. He believed it was 1500 ft. on the channel; so when they got washing again they might expect to make large profits. The last letter from the superintendent expressed that opinion. At the Red Dog claim the washing had been carried on in the side dirt on the edge of the tunnel, and small profits had been made from month to month. He did not imagine that those profits would increase to any material extent, as it would take some time to get into the centre of that channel, but there was a short tunnel commenced at the end, and Mr. Powers proposed to send in, and expected to get two seasons' washing from that whilst he was driving the main tunnel; so they would start the new season with the three claims—the Neece and West, the Waloupa, and the Red Dog—all in profitable condition. The present washing season had not yet concluded, and he hoped it would not for some time to come. No letter had been received from Mr. Powers for the past month. Probably he was attending, with many other mining superintendents, to a lawsuit which had been brought against the miners, and it would be seen by the accounts that this company had paid 8*s.* odd towards meeting the expenses which had been incurred in the matter. This was probably the reason also why the superintendent had not up to the present time forwarded his annual report of the mine. When it was forwarded it probably would not be printed, but would be published in the *Mining Journal*. With respect to the accounts, the profit for the year was only 52*s.* They could not expect more with such a dry season. There had been an expenditure of 52*s.* upon the Waloupa. They must consider themselves well off to make the profit they had done, considering they had only had six months working, and only one claim producing profits. (Hear, hear.) A shareholder had mentioned to him that he thought the cost rather high in proportion to the returns; but it must be borne in mind that they had only one claim which was making profits at all, and there was in hydraulic mining an abnormal rate of cost which could not well be reduced. They might take the monthly cost at an average of about \$5000 or \$6000. He was sure the superintendent exercised all the economy in his power consistent with the proper working of the mine; therefore, they would understand that if the other claims increased their returns the profits compared with the expenses would proportionately increase. The profit of \$5500 which had already been advanced enabled the directors to pay the amount due to Mr. Powers, the interest which had accrued on the loan in California, and 100*s.* had also been paid of the amount owing in London, and they had 10*s.* more at the bankers than they had, so that they stood in a better position than last year, and he believed that by the time the present season was over they would find themselves in a still better position. Mr. Bowe, one of the directors, who knew the mines intimately, was of opinion that they could get one head of water to carry them through to the next water season, which was a consummation devoutly to be wished for. Last year the sundry amounts owing in London was 24*s.*, and now 90*s.*, but this was owing to the amount which the directors raised amongst themselves to meet the debenture-holders. He was sorry they had not been able to pay Mr. Lavington much money. They were, on the whole, about 150*s.* worse than this time last year, but they had debited in profit and loss the interest on the debentures 40*s.*, and office expenditure 29*s.*, so that, although they had paid 89*s.*, they were only 150*s.* worse off. (Hear, hear.) In conclusion, the Chairman moved the adoption of the report and accounts.

The CHAIRMAN said the directors were also disappointed that it had not arrived, but no doubt it was to be accounted for, as he had already stated, by the absence of the superintendent in connection with the lawsuit. When it came it would be published in the *Mining Journal*. The directors were desirous to be as economical as possible, and, therefore, did not propose to go to the expense of printing it and sending it round to the shareholders.

Mr. GEORGE BATTERS said he thought it ought to go forth that the directors had received no fees, and none were charged in the accounts. Furthermore, he should like it to go forth clearly that the cost of the Waloupa tunnel and other expenses had not been charged to capital account, but to running expenses. He thought that, on the whole, they had done as well during the past year as could have been expected.

The CHAIRMAN said he thought he had already made that sufficiently clear. He thought that the passing of such items to capital account in a hydraulic mine was erroneous.—The resolution was then put and carried.

The CHAIRMAN moved the re-election of Mr. Bowe as a director. He did not know how they could get on without Mr. Bowe, who had lived many years in California, and was intimately acquainted with the hydraulic process, and knew every inch of the company's claims. He was sorry they had not been able to give Mr. Bowe remuneration for his special services in going out to the mine.

Mr. SEELEY seconded the resolution, and said he was sure the presence of Mr. Bowe on the board must give additional confidence to the shareholders.

The CHAIRMAN said Mr. Bowe had been with the company some years, and did not run away as some American gentlemen did from mines when they were unlucky. (A laugh.)—The resolution was carried.

Mr. Bowe acknowledged his re-election, and said he had done everything in his power to promote the prosperity of the company. He might mention that since the purchase of the property they had tunneled in the Neece and West 1400 ft., on the Red Dog 850 ft., and on the Waloupa 750 ft., making altogether 3000 ft., at a cost of \$60,000, which had been paid out of profits. The other improvements they had made upon the property amounted to \$20,000. The condition of the

property at the present time was this. They had now three claims, exclusive of the Uncle Sam, which he believed was the best they had got, and which would not cost so much to bring into working order, as they would be, he believed, to utilise another tunnel, which was being driven by another company. In the suit which had taken place between the miners and the ranchmen, Mr. Vincent G. Ball, superintendent of the Milton Company, testified that there were 28 miles of the river channel, and there were 200 companies located on it, and in all places on the run where they had got down to the bed rock it had paid from \$150,000 to \$200,000 per acre. Taking the length of channel which this company possessed, it would amount to 27 acres, so that according to that estimate they would have something like \$4,000,000. Another gentleman, the superintendent of the North Bloomfield Company, Mr. Hamilton Smith, estimated the produce of the hydraulic mines in California at between 12 and 13 millions in 1876, at between 11 and 12 millions in 1877, and at 13 millions in 1878; and he also estimated that not more than one tenth of the gold on the Blue Lead channel had been extracted. He said that the compromise made with Mr. Heyward last year, by which the company possessed all the Mallory claim instead of half, was an advantageous one. He hoped that from the start of the next water season they would be making profits from the three claims. (Cheers.)

The auditors, Messrs. C. O. Rogers and C. Hopkinson, were re-elected.

A cordial vote of thanks was then passed to the Chairman and directors. The CHAIRMAN, in acknowledging the compliment, said the confidence of the directors in the property remained undiminished. He believed they had turned the corner. They had had many uphill difficulties to contend with, but not more than the other hydraulic mines. The Bloomfield had spent something like \$3,000,000 in opening up their claim, and this company had spent 3,000*s.*, which had been taken out of profits, and he hoped they were now on the point of reaping some benefit. He had great hope in the Waloupa claim. He had never seen such a well-defined channel, and he believed that they would meet with something very good there.—The meeting then broke up.

##### YORKE PENINSULA MINING COMPANY.

The annual general meeting of shareholders was held at the Cannon-street Hotel on Tuesday.—Mr. F. P. WARD in the chair.

The notice calling the meeting was read by Mr. CHAS. GRAINGER, the secretary.

The following is an extract from the directors' report:—

The continued decline in the price of copper during the period now to be reported on has made the position of all mines producing that mineral very difficult to deal with. While the Kurilla Mine has continued to open up in a manner which has quite realised the expectations of your directors, it has not been able to do much more during the year 1877 than to pay its way out of the proceeds of the ore that has been raised. It is satisfactory to know, however, that much of the work that has been done during the year has been directed to the important object of keeping the shafts and levels well ahead of immediate requirements, and to laying open reserves of ore to be taken out and realised as soon as there shall be a more favourable market for copper. This is undoubtedly a prudent course to follow, especially when copper is very low in price. Capt. Anthony's reports shows that at the end of May last reserves to the extent of 3500 tons of ore had been opened up by the work that he has been doing over and above the ore which he has necessarily raised and sent to market to meet the current expenses of the mine. During the year 1877 there were sold in the colony 344 tons 16 cwt., and shipped to England 832 tons, together 1178 tons 16 cwt. of ore. From January 1 to May 31, 1878, there were raised 450 tons of ore, the greater part of which had been shipped to England, and there remained on hand at the mine at the latter date 119 tons of ore of 17 per cent., and 700 tons of dredge ore of about 5 per cent.

The CHAIRMAN said it was such a short time since he had given them an account of their various properties that it was hardly necessary to take up their time to-day by doing more than supplement the statement in the report as to the proceedings during the past six months. They were all aware that it had been the common fate of almost all mining enterprises to suffer from low prices. The price of copper was now about 70*s.* per ton in place of about 80*s.* per ton 12 months ago, and it was simple rule of arithmetic to calculate what was the difference upon the quantity raised by the company during the past 12 months. Under all the circumstances it was satisfactory to know that whilst many mining companies had succumbed, and others were only just able to pay their way, this company had been able to pay their way and a little more. The copper raised during the last 12 months had provided the means of carrying on the important operation of driving up to Grainger's shaft, deepening Morphett's shaft, and sinking Hall's shaft from the 45 to the 55, and in a letter received that morning, in addition to other information, it was stated that it was the intention of the captain to drive on the 55 east and west in confidence of finding ore there. The only two portions of the property which they were now working were the Kurilla and Morphett's lode, both working in a satisfactory manner. The operations up to the present time had resulted in laying bare over and above the ore extracted from the mine something like 4000 tons of ore, which was a very satisfactory feature, and of considerable value. A minority of the shareholders, and, of course, their opinion, was entitled to respect, had rather urged upon the board to utilise the reserves and pay a dividend, and hereby increase the value of the property. The policy of the directors had been to adopt the prudent course of getting into a safe and sure position before declaring a dividend. Too great haste to realise profits out of ore in sight had been the ruin of many companies. They knew the difficulty which the directors had experienced in getting the money to enable them to work the mine; it came in only by slow and painful processes. The idea was as soon as possible to provide the necessary machinery, and as soon as this was properly at work, the cost would be considerably reduced, and the directors hoped, therefore, before long to be able to show that the time had arrived for a dividend. Each time the shareholders met the prospects were decidedly improved, and certainly this was the case to-day. In the letter received that morning it was stated that they had raised 150 tons of ore in the last month, in the place of 100 tons in the previous months, and the quantity of reserves had been increased, which was an important consideration. A means of providing machinery had been an important consideration at the board. Almost all the means suggested had been debated at the board, who had turned their very anxious attention to the subject, and they believed that in the course of a short time some valuable machinery in the colony would be available which would be adapted for the purposes

offering to erect his stamps on the mine for trial at his own expense on condition that if he should prove after three months' trial that he could stamp the stuff for less than 1s. per ton, the stamps should be purchased by the Dolcoath adventurers. The committee thought, on consideration, that this offer could not be accepted in its present form.

Capt. JOSIAH THOMAS stated that the mine was still looking exceedingly well; and he believed he might truthfully say that it never looked better. He was glad to say that they were not confined to one point only, as they would see on reference to the report, but that there were several productive points in the mine. The western part of the mine was opening very well. The 314 was being driven very rapidly towards that part, and in about five months' time they expected to reach Harriett's shaft, where they would lay open a piece of ground worth probably from 150,000l. to 200,000l. (Applause.) They would remember that at the last account the committee reported that Col. Beaumont had made an offer to drive the 314 west at 34l. per fm. Just after the account he received a letter from Col. Beaumont, stating that he was surprised to see it reported in the *Mining Journal* that he had offered to drive at 34l. per fm., and the mine to supply the air. His offer was to drive with his drill at 34l. per fathom, including air, or 28l. per fm., and the mine to supply the air. They thought, from their previous experience with the Barrow rock drill, that they could drive at very much less than 28l. under their own supervision. The cost of driving the end during the last two months, including air, was less than 17l. per fm. The present month he thought they would drive 11 fms. at something like 16l. per fm., as they were driving faster. Some time previously they were driving with hand labour at a cost of 26l. per fm., but the miners only drove 9 or 10 ft. per month, whereas the boring machine did about as many fathoms. In about two months more they would have sunk the engine-shaft about 15 fms. under the 338, when it would be necessary for them to start a new level. An engineer representing another boring company in London had visited the mine, and promised to write him (Capt. Thomas) and make an offer. If, however, they could get any boring machine in the world to do the work cheaper than they were doing it, then all he could say was he would like to have it. If they wanted to open up the mine they must have the necessary appliances for treating it. He then spoke of putting in skips instead of using kibbles, and said he believed they would be able to increase the returns to 450 tons a quarter. The average price of tin for the last three months made a difference of something like 100l. against the mine.

Mr. WHEAT asked what the cost of stamping the stuff was; and Capt. THOMAS said about 1s., the same as Mr. Cox's, only that gentleman wanted them to lay out money in purchasing the stamps, so that they would be the purchase money out of pocket.

The CHAIRMAN then moved that the accounts and agent's report be received and adopted.—Mr. HOLMAN seconded, and it was carried unanimously.

After the meeting a dinner was provided, and on the removal of the cloth the CHAIRMAN gave the usual loyal toasts.

Capt. THOMAS, in responding for the agents, said it would not be wise for them to increase their returns very much with the present low prices of tin. There were, he said, few rich spots of tin in Australia and Tasmania, and so there were in Cornwall. He did not think Cornwall was worse off than other tin-producing districts.

Capt. PEARSE, the oldest agent in the mine, also responded.

Capt. THOMAS, on rising again, said there had been a good deal of talk and writing in the papers lately about the laziness of Cornish miners, and he supposed those present would think the men in Dolcoath were as lazy as others who were represented to be. As far as their men were concerned, he believed he might say that three fourths of them worked very well, and so long and hard as men ought to work, but there were others who were younger and liked wandering about the country. They should try to encourage as far as they could those who did work.

Capt. A. JAMES, in responding for the neighbouring mines, referred to the great depth of Dolcoath Mine, and said it seemed to him that the deeper they went the larger and richer were their resources.—Capt. C. THOMAS, of Cook's Kitchen, thought the agents generally did not sufficiently encourage the hard working miner. They should make the miner interested in his work.

Capt. A. JAMES proposed the health of Mr. LOAM, the engineer, who introduced the Barrow rock-drill into the mine; and in responding Mr. LOAM recounted the difficulties with which they had to contend when the boring machine was first brought into the mine. The men were more efficient in using it than at first, and as a result they were able to drive 10 fms. a month, the agents expected to do 11, and he was looking forward to 12 fms. a month for the future.—After some further remarks the meeting separated.—*Western Daily Mercury.*

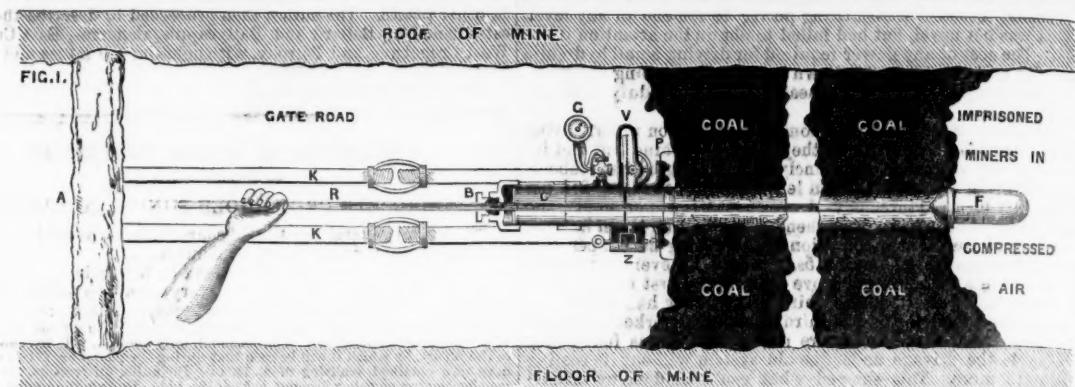
**BOTALLACK.**—At the meeting, last week, Mr. Wellington said he had known the mine rich and the mine poor, and it was a great pleasure to him to see it doing so well, even in these depressed times. There were very few mines in the county that could cope with it, and he hoped that flourishing times were still in store. For 18 years, when he was identified with the management, Botallack paid 1000l. a year in dividends; and since then 150,000l. had been divided. He only hoped Botallack would survive to pay another 150,000l. For 60 years Botallack had never failed to ultimately realise the hopes of the adventurers. The Purser added that the best proof of the excellence of the mine was that in these days it could so nearly pay costs. Still, great credit was due to the agents for the complete revolution made in the economy of the mine. In the course of a conversation the Purser said that the trial of Sholl's pneumatic stamps, permitted to be made on the mine, had been great success, and he had no doubt whatever that they would come into general operation. The erection of the stamps, in the first place, was very cheap, and if they were going to put up new stamps Sholl's were the ones he should be in favour of. The surface agent, Capt. J. Thomas, who has been a tin dresser all his life, being asked for his opinion respecting the stamps, said they had given them a pretty good trial—almost in every shape and form. It was a very pretty machine, with a nice motion. First they tried the stamps with No. 36 grates, and 1 ton of stuff per hour was passed through, equal to 24 heads of the ordinary stamps. But that did not stamp the stuff fine enough for Botallack tin, which required to be broken so fine that the grain could not be felt between the fingers. But with the same grate the ore from more than nine mines out of every ten in Cornwall would be successfully treated. But at Botallack not more than half the tin was obtained out, and what was got out was low produce. They tried two other grates, but neither would answer. Then flosses were suggested, and he must confess that, with the stamp head making from 140 to 150 blows per minute, he did not believe they would answer; but he was exceedingly pleased to be able to say that he was wrong, for, after three or four trials, they flossed as well as the old stamps. Of course, with flosses the pneumatic stamps would not do so large a quantity, but they then did equal to 16 heads of stamps. Mr. R. Wellington said at Park Mines Sholl's stamps were doing exceedingly well, and the purser remarked that, were the times favourable to the outlay of capital, those stamps would be universally adopted.

[For remainder of Meetings see to-day's Journal.]

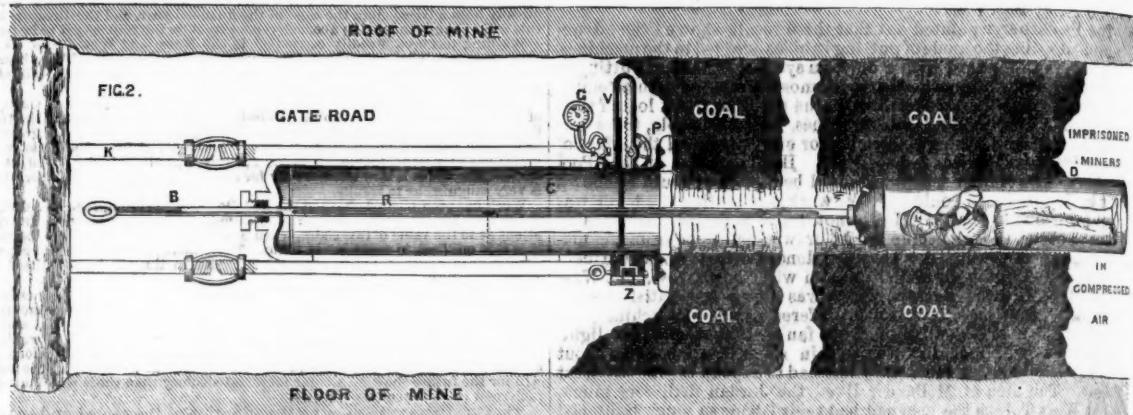
**MANUFACTURE OF SULPHURIC ACID.**—Some improvements, consisting chiefly in the manipulations of the retorts, their disposition and composition, and in the manufacture of the anhydrite of sulphuric acid, have been invented by Messrs. MAJERT and Co., of Bahnhof Schlebusch, Germany. In arranging the retorts which are used for the splitting up of sulphuric acid, they set the unburnt retorts in the furnace, and afterwards fire the furnace, or they take retorts brought at least to red heat, and put them in the heat furnace. In the latter manner they recover the being spoilt retorts. The asiform products arising from the decomposition they draw off by channels situate in the bottom of the furnace, and leading therefrom either across one or more heat retorts, or directly to the refrigerators by a tube for leading away the gases. To save the retorts they place a second retort inside the retort of decomposition, and in this second retort the sulphuric acid (which must be split up) firstly enters by an inlet tube suitably arranged above the inner retort. The liquid obtained by the refrigeration of the gases coming out of the retorts of decomposition contains much sulphurous acid, and by making this liquid hot they liberate the sulphuric acid, and lead it back again to the mixing of gas  $S O_2 + O$ . The contact action they manage in iron or copper vessels in lieu of the clay vessels hitherto used, and to ensure the stoichiometrical proportion  $S O_2 + O$  they take oxide of copper, or iron, or of chromium, or mixtures of these oxides one with another, in lieu of platinum or asbestos hitherto used. The mixing of gas  $S O_2 + O$  escaped of the contact action, after taking from it the anhydrite, will be brought anew in contact with the substance.

## MINERS' LIFE PRESERVER.

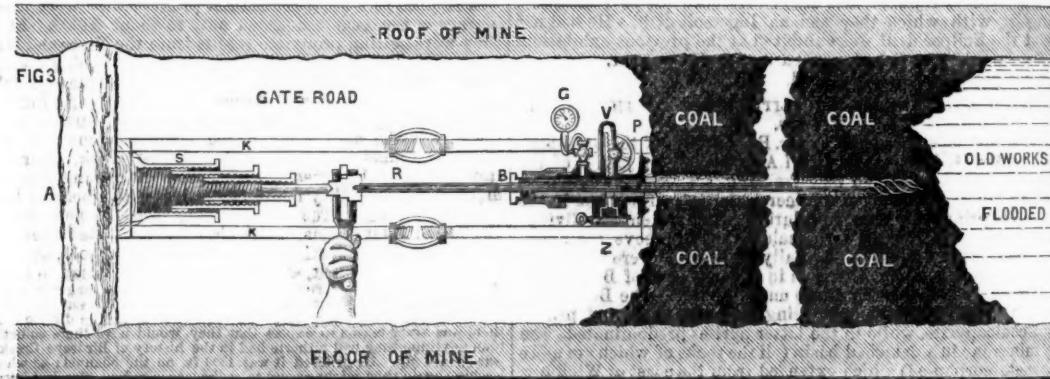
APPARATUS FOR PASSING FOOD, MESSAGES, AND OTHER NECESSARIES TO IMPRISONED MINERS.



APPARATUS FOR DELIVERING MINERS FROM THEIR ENTOMBMENT.



APPARATUS FOR ASCERTAINING THE STATE OF MINE AS REGARDS APPROACHING DANGER, SUCH AS THE PRESENCE OF OLD FLOODED WORKINGS OR THE PRESENCE OF CONFINED GASES.



### MINERS' LIFE PRESERVER.

It is remarkable to observe in connection with the working of mines how easily a good property may be made unremunerative, and how much may be done to make a property adversely situated yield profit, according as the engineer entrusted with the management displays judgment and economy, or otherwise; and it not unfrequently happens that the difference between profitable and unprofitable working is dependent upon details which to some appear so trifling as to be unworthy of attention. For some years past Messrs. MAX and MOUNTAIN, of Birmingham, have given considerable attention to the manufacture of engineering and millwright work, especially adapted for use in and about mines, and it cannot be doubted that by careful attention to details they have succeeded in making machines which work admirably, and have given great satisfaction. The fact of supplying a steam-pump capable of raising over 5000 gallons of water per hour at a cost of only 25l. has enabled many small works to be carried on which with expensive machinery would have been altogether impracticable, whilst the improved lubricators and other little matters which they have adopted have done much to facilitate economic working after their machines have been erected. They have now turned their attention to the manufacture of a miner's life-preserver, which, should it prove as effective in application as have their other machines, there can be no doubt it will be a great boon to the working miner, and of enormous pecuniary value to the owners of mines.

The lamentable accident at Pontypridd in April, 1877, led Mr. A. UPWARD, of Queen Anne's Gate, Westminster, to devise a method of rescuing the miners in the case of similar accidents. He has already brought it before the South Wales Institute of Engineers, and is now taking steps for its general introduction. Mr. Upward states that he has already used a modified form of this apparatus for some years past with perfect success for the purpose of drilling and tapping gas and water mains and steam-boilers under pressure, and inserting taps therein. He had no doubt of being able to cope successfully with compressed atmosphere in which the miners were enclosed, as he had had experience of pressure far higher than any that was likely to be encountered at the scene of accident. He considers it a most unfortunate circumstance that he did not happen to have his attention earlier called to the features of the accident, for had the instrument been used which he took with him the life of one man would, he believes, certainly have been saved, and the miners freed during their imprisonment.

One form of apparatus is designed for passing food or other necessities for the preservation of life. A piece of timber, *a*, fixed into the floor and roof of the mine is used for fixing struts, *k*, *k*, furnished with right and left handed screws, with which the apparatus is firmly held to the face of the coal, the escape of air or gas being prevented by packing, *p*, which is placed between the flange of the apparatus and face of the coal. There is a moveable chamber *c*, above the slide-valve, in which is placed the vessel, *f*, for passing food, lamps, and other necessities to the imprisoned miners; a pressure gauge, *g*, for ascertaining the pressure of the compressed air, a slide-valve, *v*, which can be opened and closed at pleasure, and gives the operator full command over the compressed air, gas, or water that may be confined in the mine. There is a rod, *b*, passing through a stuffing-box, *b'*, and to this the boring apparatus is fixed, and by it the vessel, *f*, holding the food, &c., is pushed forward to the imprisoned miners after opening the slide-valve, *s*. This valve is closed whenever it is necessary to open the external chamber, *c*, either for the introduction of drills to make the hole through the coal, or for the passage of the vessel, *f*, containing food, &c., for the miners. There is a covered port, *z*, which can be opened or closed at pleasure, affixed to the bottom of the slide chamber for the purpose of cleaning it should coal dust or other obstruction enter this chamber, and so hinder the due action of the slide.

It will be remembered that in the case of the Pontypridd accident

it was found that on breaking through the coal where the condensed air was confined it escaped with such force as to cause the loss of the life of one of the men, hurling him with violence into the orifice. Holes were made through the wall of coal in hopes of being able to pass in a supply of food, but this was rendered abortive by the escape of the air which kept it back; and, moreover, the imprisoned miners finding the water rising in upon them immediately did their best to stop the holes with coal dust. Mr. Upward further proposed that a glass lens with a strong light behind it may be fixed to the chamber, *c*, to reflect a beam of light through the hole bored in the coal. This may be employed in cases in which an explosive atmosphere is suspected, and would enable the imprisoned men even under such circumstances to read written communications and pass back replies with perfect safety. It will be evident, then, from this description that this apparatus gives the means of furnishing men in the situation of the imprisoned miners with the three great requisites of life—food, air, and light, and thus prolonging indefinitely the time during which rescue could be attempted. Besides which it will be seen that in the case of the Pontypridd miners the pressure of the enclosed air would have been entirely under control, and that further any accidental leakage through fissures could have been adequately supplied. Thus in their case the water could have been kept back, and under perfect control, and without any danger from a sudden release of the confined air, which might so easily have proved fatal to both the miners and their deliverers.

Mr. Upward suggests that in every district one of the apparatus should be available, but admits that it is hardly to be expected that each mineowner should possess a complete set of apparatus, especially the large one arranged for carrying men. Probably all that could be expected in this respect would be that the apparatus for facilitating boring should be found as part of the stock of all well-regulated mines. He would suggest, however, that depots should be formed in the different mining districts, at which apparatus of this kind should be deposited, and could be rapidly forwarded in case of emergency to the spot where they were required. These depots should be furnished not only with the above described apparatus, but with portable air and water pumps, constructed so as to travel by road or railway, medical and surgical appliances adapted specially to mining casualties, and indeed such stores as the experience of the district suggests as being most useful in cases of mining accidents.

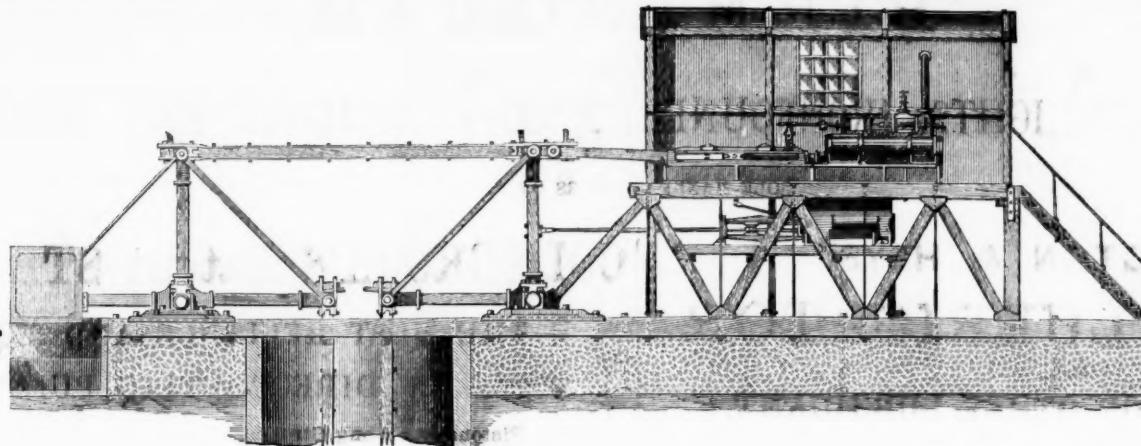
These depots should be, of course, in the most accessible part of the district. They ought, he thinks, to be sufficiently supported by voluntary effort on the part of mineowners and miners. They should be officered by tried hands, and their staff should be miners chosen for practical experience, coolness, and courage. Efficiency should be maintained by periodical inspections, presenting rewards and decorations to the efficient. Means should also be taken to make miners generally acquainted with their duties in assisting what he terms the "miners' brigade." The brigade would speedily obtain a valuable practical insight into the best method of proceeding in cases of accident. In a word, they would be exactly analogous to the life-boat crew or fire-brigade of a great city, and would, no doubt, speedily display the same kind of cool, practical courage, and the same readiness in resource, and the same steadiness in discipline as those crews and brigades have always shown.

**HOLLOWAY'S OINTMENT AND PILLS—COUGHS, INFLUENZA.**—The soothing properties of these medicaments render them well worthy of trial in all diseases of the respiratory organs. In common colds and influenza the pills are internally, and the ointment rubbed over the chest and throat are exceedingly efficacious. When influenza is epidemic, this treatment is easiest, safest, and surest. Holloway's pills purify the blood, remove all obstructions to its free circulation through the lungs, relieve the over-gorged air tubes, and render the respiratory organs free, without reducing the strength, irritating the nerves, or depressing the spirits, such are the ready means of saving suffering when any one is afflicted with colds, bronchitis, and other chest complaints, by which so many persons are seriously and permanently afflicted in most countries.

# PORTABLE PUMPING ENGINES FOR TEMPORARY AND SINKING PURPOSES.

Compound  
Differential  
Pumping  
Engines.

Air Compressing  
Engines.



CATALOGUES ON APPLICATION.

Hydraulic  
Engines and  
Mining Plant  
of all kinds.

HATHORN, DAVEY, & CO., LEEDS.

POLLOCK AND POLLOCK,

LONGCLOSE WORKS, NEW TOWN, LEEDS,

POLLOCK'S PATENT BRICK PRESS,

The New "XL" Brick-Making Machines;

THE CHEAPEST AND BEST IN THE MARKET.

Improved Grinding Pans, with patent self-acting delivery.  
Vertical and Horizontal Engines.

COLLIERY ENGINEERS.—WINDING ENGINES OF ALL SIZES.

POLLOCK AND MITCHELL'S PATENT KILNS are the Cheapest and Simplest.

London Office—155, Fenchurch Street, E.C.

BRYDON AND DAVIDSON'S ROCK DRILL,

SELECTED BY THE BRITISH AND OTHER GOVERNMENTS.

Reduced prices of this Rock Drill, Nos. 1 and 2, £32 and £34.

SUBJECT TO DISCOUNT.

IMPROVED AIR COMPRESSORS.

Makers of Pumping and Winding Engines, Steam Hammers, Boilers, Pump Pipes, &c., &c. Castings of all kinds.

BRYDON AND DAVIDSON, ENGINEERS,  
WHITEHAVEN.

JOHN MARSDEN,

MANUFACTURER OF

Air Tubing and Improved Brattice Cloth,

Tarred, Oiled, and Non-Inflammable.

THE OILED CLOTH IS ESPECIALLY RECOMMENDED FOR DAMP MINES, AND IS ALSO A GOOD COVERING FOR SHEDS.

THE NON-INFLAMMABLE FOR THE MORE DANGEROUS MINES.

Samples and prices free, on application at the Works,

VARLEY STREET, OLDHAM ROAD,  
MANCHESTER.



BICKFORD'S PATENT  
SAFETY FUSE  
FOR CONVEYING  
CHARGE IN  
BLASTING ROCKS &c.

OBTAINED THE PRIZE MEDALS at the "ROYAL EXHIBITION" of 1851; at the "IMPERIAL EXPOSITION," of 1862 and 1874, in London; at the "INTERNATIONAL EXPOSITION," held in Paris, in 1865; at the "INTERNATIONAL EXPOSITION," in Dublin, 1865; at the "UNIVERSAL EXPOSITION," in Paris, 1867; at the "GREAT INDUSTRIAL EXHIBITION," at Alton, in 1869; TWO MEDALS at the "UNIVERSAL EXHIBITION," Vienna, 1873; and at the "EXPOSICION NACIONAL ARGENTINA," Cordeva, South America, 1872.

BICKFORD, SMITH AND CO.,  
OF TUCKINGMILL, CORNWALL; ADELPHI  
BANK CHAMBERS, SOUTH JOHN-STREET, LIVER  
POOL; and 85, GRACECHURCH-STREET, LONDON,  
E.C., MANUFACTURERS AND ORIGINAL  
PATENTEES OF SAFETY-FUSE, having been informed that the name of their firm has been attached to fuse not of their manufacture, beg to call the attention of the trade and public to the following announcement:—  
EVERY COIL OF FUSE MANUFACTURED by them has TWO SEPARATE THREADS PASSING THROUGH THE COLUMN of GUNPOWDER, and BICKFORD, SMITH, AND CO. CLAIM SUCH TWO SEPARATE THREADS AS THEIR TRADE MARK.

## ASBESTOS.

A NEW and INDESTRUCTIBLE ASBESTOS PACKING for steam joints and glands, possesses an unusual power of resisting heat, works efficiently under the highest pressure of steam, being practically indestructible. Apply to—

THE PATENT ASBESTOS MANUFACTURE CO. (LIMITED),  
31, ST. VINCENT PLACE, GLASGOW,  
AND 10, MARSDEN STREET, MANCHESTER.

THE BIRMINGHAM WAGON COMPANY  
(LIMITED)

MANUFACTURE RAILWAY CARRIAGES and WAGONS of EVERY DESCRIPTION, for HIRE and SALE, by immediate or deferred payments. They have also wagons for hire capable of carrying 6, 8, and 10 tons, part of which are constructed specially for shipping purposes. Wagons in working order maintained by contract. MANUFACTURERS also of IRONWORK, WHEELS, and AXLES. EDMUND FOWLER, Managing Director.

WAGON WORKS,—SMETHWICK, BIRMINGHAM.

ALEXR. WILSON & CO.,

VAUXHALL IRONWORKS,

LONDON, S.W.,

MANUFACTURERS OF

THE VAUXHALL DONKEY PUMPS.

THE EXCELSIOR DIRECT-ACTING PUMPS.

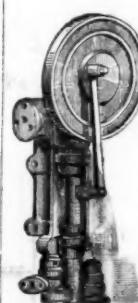
HIGH-PRESSURE SCREW ENGINES

COMPOUND SCREWS ENGINES.

PATENT SURFACE CONDENSING ENGINES.

PATENT PADDLE ENGINES.

HOISTING MACHINERY.



ILLUSTRATED AND PRICED CATALOGUES ON APPLICATION.

BENNETT'S SAFETY FUSE WORKS

ROSKEAR, CAMBORNE, CORNWALL.

BLASTING FUSE FOR MINING AND ENGINEERING PURPOSES.

Suitable for wet or dry ground, and effective in tropical or Polar Climates.

W. BENNETT, having had many years' experience as chief engineer with Messrs. Bickford, Smith, and Co., is now enabled to offer Fuse of every variety of his own manufacture, of best quality, and at moderate prices.

Price Lists and Sample Cards may be had on application at the above address.

LONDON OFFICE, —H. HUGHES Esq., 95, GRACECHURCH STREET.

MEXICO, NEW MEXICO, ARIZONA, UTAH, NEVADA  
AND CALIFORNIA.

F. M. F. CAZIN,  
MINING AND CIVIL ENGINEER,  
At BERNALLILLO, NEW MEXICO, U.S. OF AMERICA.

Has 24 years' experience in Mining and Smelting, and 10 years' experience in American Business and Law, offers his services at moderate charges for Reporting on Mining and other Property in any of the above-named States or Territories; gives correct, safe, and responsible advice as to securing full titles and possession; and, as to best mode of utilising the property, will assist in settling existing difficulties by compromise, and in disposing of developed mining property when held at real value; offers his assistance for securing undeveloped mining properties at reasonable prices. As to care taken in reporting, reference is made to the *Mining Journal* Supplement, April 1, 1876, containing report on property of the Maxwell Land Grant and Railway Company; as to technical standing, to the prominent men of the trade—compare *Mining Journal* of Aug. 30 and Nov. 31, 1872, and *New York Engineer and Mining Journal*, Feb. 26, 1874.

M. R. W. F. STANLEY, MATHEMATICAL INSTRUMENT MANUFACTURER TO H.M.'S GOVERNMENT, COUNCIL OF INDIA SCIENCE AND ART DEPARTMENT, ADMIRALTY, &c., MATHEMATICAL, DRAWING, and SURVEYING INSTRUMENTS of every description, of the highest quality and finish, at the most moderate prices.

Price-list post free.  
ENGINE DIVIDERS TO THE TRADE.  
ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.

Just published, cloth limp, price ls. 6d.  
THE COLLIERY READY-RECKONER AND WAGES CALCULATOR.

By JAMES IRELAND.

"Will be the means of preventing many disputes between pay clerks and colliers."—*Mining Journal*.

To be had on application at the *Mining Journal* Office, 26, Fleet-street, E.C.

# MAY AND MOUNTAIN, BIRMINGHAM,

ENGINEERS, MILLWRIGHTS, IRONFOUNDERS, COPPERSMITHS AND BOILER MAKERS,

SOLE MANUFACTURERS OF

## TORKINGTON & HEYS' PATENT LUBRICATOR FOR OIL, TALLOW, OR OTHER LUBRICANT.

Entirely Self-acting.

The Flow of Grease, being regulated by the Steam, is constant, varying with the amount of Steam used.

No Waste.

Perfect Lubrication.

Greatest possible Economy.



No.	Size. Inches.	Horse-power.	Price.
00	1½	Agricultural } 8s. 6d.	
0	1½	Engines... } 10 6	
1	2	5 to 7	14 6
2	2½	7 10	17 6
3	3	10 20	27 6
4	3½	20 30	37 6
5	4½	30 50	47 6
6	5	50 70	60 0
7	6	70 100	90 0
8	7	100 200	105 0

## COLEBROOK'S Patent STEAM PUMPS, THE MOST RELIABLE AND ECONOMICAL DIRECT-ACTING PUMPS.

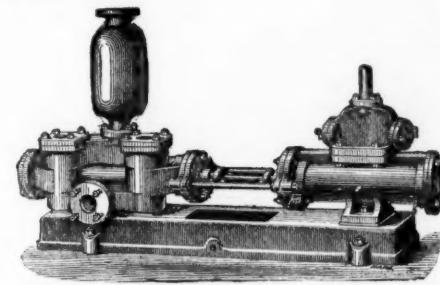
Short Pistons and Long Strokes.

The Slide Valve is worked by the Exhaust Steam alone.

No Tappets, Valves, Levers, or other Mechanical Appliance.

All parts Simple and Easy of  
access.

Adapted for all purposes and to  
all circumstances.



### PRICES OF A FEW LEADING SIZES.

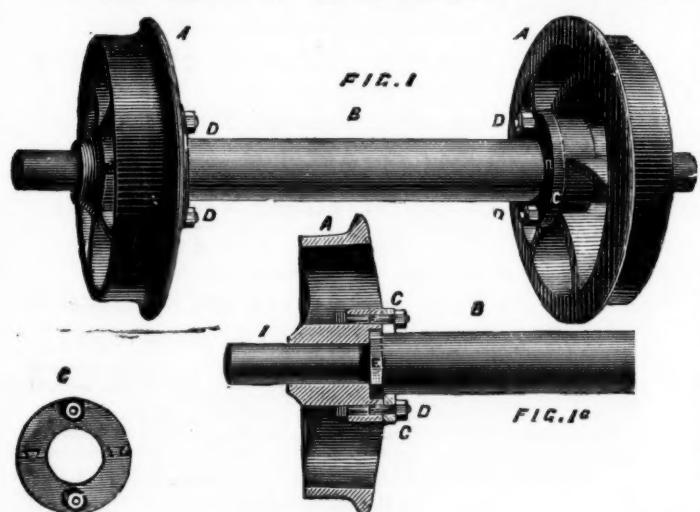
Steam cylinder ...In.	3	4	4	6	6	7	8	8	10
Water ditto ...In.	1½	2	4	4	6	6	6	8	8
Stroke .....	12	18	18	18	18	18	18	18	8
Gallons per hour.....	720	1260	5040	4280	9660	8700	7920	12,180	12,060
Price .....	£ 16	19	25	33	41	45	50	65	80

LARGER AND SMALLER SIZES IN ALL COMBINATIONS OF STEAM AND WATER CYLINDERS.  
DESCRIPTIVE PRICES ON APPLICATION.

## JOSEPH FENTON & SONS,

MANUFACTURERS OF  
CAST STEEL AND FILES,  
AND

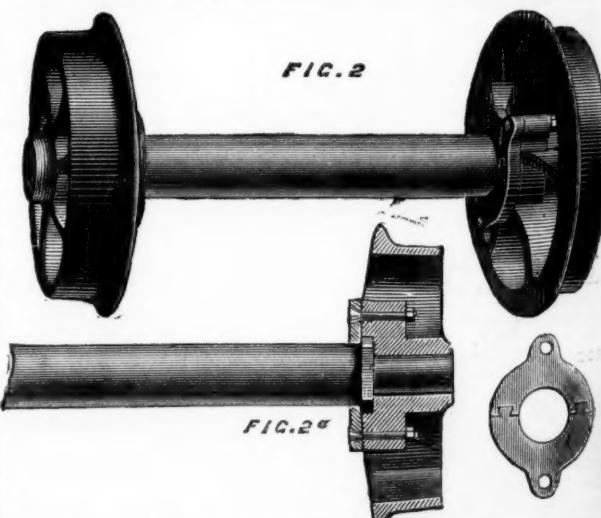
CRUCIBLE CAST STEEL CASTINGS,  
Sykes Works, Eyre-st. & Bridge-st., Sheffield. London Office: 118, Cannon-st., E.C.  
A New Patent Method of Fitting up Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of cast wheels and axles fitted up for outside bearings, and Figs. 2 and 2a for inside bearings. A A are the wheels; B is the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle, which is forged of solid steel; the axle is secured into the recess partly by being sufficiently tightly fitted to require driving home with a hammer, and partly by the washer. Around the axle adjoining the boss is fixed the washer, made in two parts and dovetailed, so as to allow of being fixed after the collar has been forged on the axle. The washer is secured to the boss by bolts and nuts, both in outside and inside bearings; in the case of inside, by means of lugs cast on the boss, and the washer made of corresponding shape; the washer is made of crucible cast steel. The only tool required for fitting is an ordinary spanner for outside bearings, and a box spanner for inside bearings.

Now what are the advantages of this method? You secure a simple way of fitting—it can be done by anyone who has seen it—the only tool required being a spanner; the wheels can be detached from or secured to the axle in a few minutes. The next



advantage is the perfect solidity attained, the wheel and axle practically becoming as one piece. The durability results from the toughness of the material, and the solidity secured in the fitting. Another thing is the wheels do not need to be put in the fire to detach them, as is the case in ordinary wheels. (N.B.—Our wheels cannot be injured by being heated and plunged into cold water, which would render other steel wheels perfectly brittle as glass.) Saving in fuel and wages is evident—no skilled labour being required to refit wheels in case of a strained axle. By adopting this system colliery owners may save hundreds of pounds sterling yearly.

J. J. ARIS AND CO.,  
MINING ENGINEERS, MINERAL AND METAL MERCHANTS,  
29, FENCHURCH STREET, LONDON, E.C.  
Mines inspected and reported upon.

Second Edition. Just published, price 8s. 6d.

A NEW GUIDE TO THE IRON TRADE  
OR, MILL MANAGERS' AND STOCK-TAKERS' ASSISTANT;  
Comprising a Series of New and Comprehensive Tables, practically arranged to show at one view the Weight of Iron required to produce Boiler-plates, Sheet-Iron, and Flat, Square, and Round Bars, as well as Hoop or Strip Iron of any dimensions. To which is added a variety of Tables for the convenience of Merchants, including a Russian Table. By JAMES ROSE.

Batman's Hill Ironworks, Bradley, near Blists Hill.

OPINIONS OF THE PRESS.

"The Tables are plainly laid down, and the information desired can be instantly obtained."—Mining Journal.

"900 copies have been ordered in Wigan alone, and this is but a tithe of those to whom the book should command itself."—Wigan Examiner.

"The work is replete on the subject of underground management."—M. BANKS.

Colliery Proprietor.

To be had on application at the MINING JOURNAL Office, 29, Fleet-street, London.

## THOMAS TURTON AND SONS, MANUFACTURERS OF

MINING STEEL of every description.

CAST STEEL FOR TOOLS. CHISEL, SHEAR, BLISTER, & SPRING STEEL  
MINING TOOLS & FILES of superior quality.

EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS.  
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE and WAGON SPRINGS and BUFFERS.

SHEAF WORKS & SPRING WORKS, SHEFFIELD.

LONDON OFFICES.—90, CANNON STREET, E.C. PARIS DEPOT—12, RUE DES ARCHIVES.  
NEW YORK STORE—102, JOHN STREET.

## HARRIS'S PATENT WROUGHT-IRON WINDOWS.

DOME AND OTHER ROOF LIGHTS, FLOOR AND PAVEMENT LIGHTS, ETC.



GREAT BRITAIN,  
UNITED STATES OF AMERICA,

ARE STRONGER, SUPERIOR, AND CHEAPER,  
THAN ANY OTHER METAL SASHES YET  
PRODUCED—COST LESS FOR GLAZING—  
ARE AS CHEAP IN MANY CASES AS WOOD

PATENTED IN

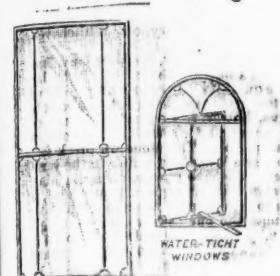
FRANCE,  
GERMANY, AND BELGIUM.



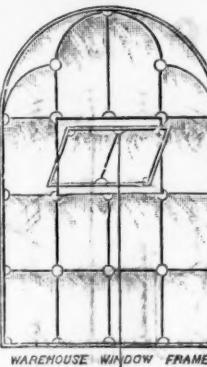
CAN BE DESIGNED AND MANUFACTURED  
TO SUIT ANY STYLE OF ARCHITECTURE  
OR POSITION WHERE A WINDOW MAY BE  
REQUIRED.



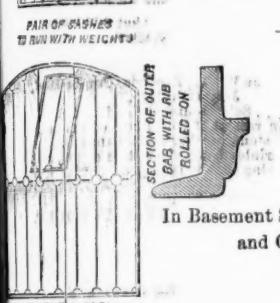
ARE BEING EXTENSIVELY USED IN—



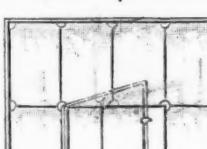
Private Houses,  
Parsonage Houses,  
Farm Houses,  
Churches,  
Chapels,  
Schools,



Lunatic Asylums, &c.,  
Public Buildings, Banks,  
Wharves, Warehouses,  
Factories, Mills,  
Breweries, &c.,  
Engine Houses.



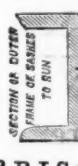
ILLUSTRATED CATALOGUES  
ON APPLICATION.



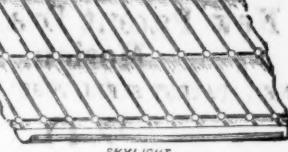
ILLUSTRATED CATALOGUES  
ON APPLICATION.



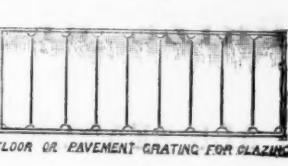
In Basement Storeys and Exposed Positions Shutters  
and Guard Bars are dispensed with.



Security is obtained in  
these Skylights without  
Guard Bars, and with less obstruction  
to Light.



EXPORT.



FLOOR OR PAVEMENT GRATING FOR GLAZING

HOME AND

SOLE MAKER—J. T. HARRIS, Engineer, Ironfounder, and Manufacturer,  
SAFE, STRONG ROOM, AND PARTY WALL DOORS, AND EVERY KIND OF CONSTRUCTIONAL AND BUILDERS' IRONWORK, LIFTS, HOISTS, ELECTRIC BELLS AND TELEGRAPHS, &c.  
90, CANNON STREET, LONDON, E.C.; AND BEAUFORT IRONWORKS, BRISTOL.

SECTION OF OUTER  
BARS WITH RIB  
ROLLED ON

SECTION OF OUTER  
BARS TO RUN

H. R. MARSDEN will exhibit in full operation at the Manchester, Liverpool, and North Lancashire Show, at Lancaster, September 3rd to 5th, one of his

### New patent Stone Breakers, with Screening Apparatus,

And on wheels to travel; also fitted with his NEW PATENT TOGGLE BEARING AND DRAWBACK MOTIONS, and REVERSIBLE PATENT FACED BACK CUBING JAWS in sections.

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

## H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

# Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws,  
in Sections, with Patent  
Faced Backs.

NEW PATENT ADJUSTABLE  
TOGGLES.

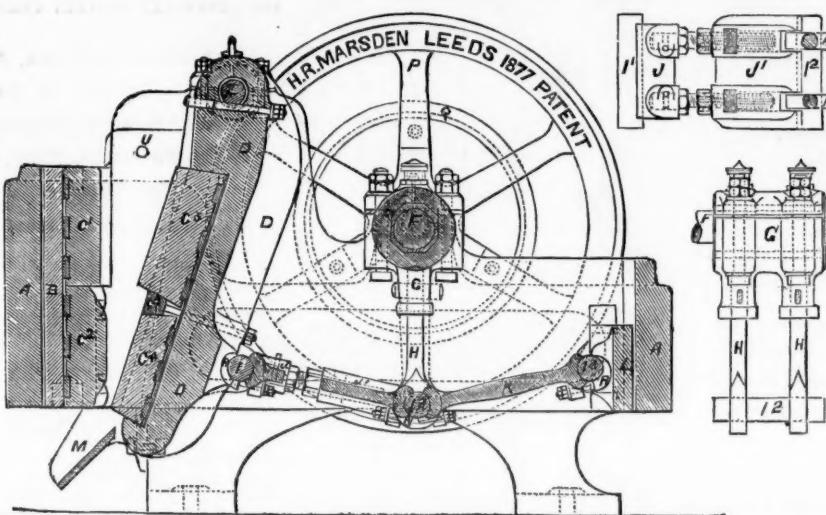
OVER 2500 IN USE.

New Patent Draw-back  
Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



#### READ THIS—

Wharhole Lime Works, Maryport, Whitehaven, November 7, 1873.

H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.  
DEAR SIR.—The machine I have in use is one of the large size, 24 in. by 12 in. The quantity we are breaking daily with this one machine is 250 tons, the jaw being set to break to a size of 2½ in. We have, however, frequently broken over 300 tons per day of ten hours, and on several occasions over 350 tons during the same period. The stone we break is the blue mountain limestone, and is used as a flux in the various ironworks in this district. We have now had this machine in daily use for over two years without repairs of any kind, and have never had occasion to complain of any inconvenience in using the machine. I hope the one you are now making for me may do its work equally well. The cost—INCLUDING ENGINE-POWER, COALS, ENGINEER, FEEDING, and all EXPENSES OF EVERY KIND—is just 3d. per ton. Should any of your friends feel desirous of seeing one of your machines at work, I shall have much pleasure in showing the one alluded to.

I am, dear Sir, yours very truly,

WILLIAM MILLER.

#### AND THIS—

Wharhole Lime Works, Aspatria, Cumberland, July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.  
DEAR SIR.—We are in receipt of your letter of 4th inst. I may just state that the stone breaker above named has been under my personal superintendence since its erection, and I have no hesitation in saying that it is as good now as it was five years ago.

I am, dear Sir, yours faithfully,

FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

#### TO COLLIERY AND MINE OWNERS.

#### R. HUDSON'S PATENT STEEL CORVES OR "TRAMS."

Patented July, 1875, and January, 1877.

Entire new principle, saving three-quarters to 2 cwt. "dead" weight per corve. Will hold 2 to 3 cwt. more coal than the ordinary kind, without increasing the outside dimensions. Adopted by—  
Messrs. THOMPSON, WISE, & Co., Burry Port, South Wales.  
Messrs. DYMOND'S Liveredge Coal Company, near Leeds.  
Messrs. W. ACKROYD and BROS., Morley, near Leeds.  
Messrs. CLAYTON and SPEIGHT, Farley, near Leeds.  
Messrs. JAS. WORMALD and SONS, Rawdon, near Leeds.  
KINGSWOOD COAL and IRON CO., near Bristol.  
MIDDLETON COLLIERY CO., near Leeds. | NEWTON COLLIERY, near Castleford. | Messrs. RUSHFORTH and Co., Adwalton, near Leeds. | T. VAUGHAN and Co.'s TRUSTEES, South Medomsley Colliery; and others.

R. HUDSON, Engineer and Ironfounder, Gildersome Street Foundry, near Leeds (Five minutes walk from Gildersome Station, G.N.R.)

## The Barrow Rock Drill COMPANY

Are NOW PREPARED to SUPPLY their DRILLS, the ONLY ONES that have been SUCCESSFULLY WORKED in the MINES of CORNWALL. At DOLCOATH MINE, in the HARDEST known ROCK, a SINGLE MACHINE has, since its introduction in July, 1876, driven MORE THAN THREE TIMES the SPEED of HAND LABOUR, and at TWENTY PER CENT. LESS COST PER FATHOM.

In ordinary ends two machines may be worked together, and at a proportionately increased speed. They are strong, light, and simple, easily worked, and adapted for ends and stopes, and the sinking of winzes and shafts.

The company are also prepared to SUPPLY COMPRESSORS, and all necessary appliances for working the said Drills.

Apply to—

**LOAM AND SON,**  
LISKEARD, CORNWALL.

## IMPROVED STEEL WIRE FOR ROPES.

### WEBSTER & HORSFALL, (ORIGINAL PATENTEE).

MANUFACTURERS OF IMPROVED STEEL WIRE FOR ROPES  
FOR COLLIERIES,

RAILWAY INCLINES, PLOUGHS, HAWSERS, &c.

SOLE MANUFACTURERS of the HOMOGENEOUS WIRE for the  
ATLANTIC CABLES of 1865 and 1866.

WEBSTER AND HORSFALL,  
BIRMINGHAM.

THE GREAT ADVERTISING MEDIUM FOR WALES.

**THE SOUTH WALES EVENING TELEGRAM**  
(DAILY), and  
**SOUTH WALES GAZETTE**  
(WEEKLY), established 1857.

the largest and most widely circulated papers in Monmouthshire and South Wales.  
CHIEF OFFICES—NEWPORT, MON.; and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the second edition at Five P.M. On Friday, the "Telegraph" is combined with the "South Wales Weekly Gazette," and advertisements ordered for not less than six consecutive insertions will be inserted at an uniform charge in both papers.

P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street,  
Newport, Monmouthshire.

THE IRON AND COAL TRADES' REVIEW.  
The IRON AND COAL TRADES' REVIEW is extensive, circulated amongst the  
Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron  
and coal districts. It is, therefore, one of the leading organs for advertising every  
description of Iron Manufactures, Machinery, New Inventions, and all matters  
relating to the Iron, Coal, Hardware, Engineering, and Metal Trades in general.

Offices of the Review: 7, Westminster Chambers, S.W.

Remittances payable to W. T. Pringle.

## THE "CHAMPION" ROCK BORER

MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED  
IRON PIPES, &c.

### Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and  
ELECTRIC BLASTING APPARATUS.



Full particulars of rapid and economical work effected  
by this machinery, on application.

CONTRACTS TAKEN, OR SPECIAL TERMS FOR HIRE.

**ULLATHORNE AND CO.,** Mechanical and Consulting Engineers,  
63, QUEEN VICTORIA STREET, LONDON, E.C.

## THE ROANHEAD ROCK DRILL.

BY ROYAL LETTERS PATENT.

This justly-celebrated Rock Drill, the only one invented that will work in the hardest rock without more than the usual repairs required by any ordinary machinery, is now offered to the public.

It has been most successfully worked in the well-known Hematite Mines of Lancashire and Cumberland. Will drive 50 to 60 ft. in hard rock without change of drill, and can be worked by any miner, and kept in repair by any blacksmith. It is the most simple rock drill ever invented, and cannot with fair usage get out of order.

Plans, Estimates, including Compressors, and all other Mining Machinery, supplied on application to the sole makers.—

### SALMON, BARNES, AND CO., MINING ENGINEERS.

Canal Head Foundry and Engineering Works, Ulverston.

## J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

### CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES  
FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS,  
RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.

STOURBRIDGE FIRE BRICKS AND CLAY.